THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

COMPUTERWORLD

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FEBRUARY 3, 1986

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IBM's possible sale of some Intel stock may reflect the semiconductor industry's capacity glut. **Page 122.**

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DEC's micro development group suffers delays in getting the company's next model to market. **Page 13.**

■

Honeywell may become the first of the BUNCH companies to deliver support for IBM's LU6.2. **Page 12.**

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The corporate micro data base management system market still lacks a dominant standard. **Page 27.**

■

The auto industry implements an electronic data interchange standard, moving closer to paperless supplier-to-manufacturer transactions. **Page 25.**

■

IBM will decide this week whether it will participate in the recently formed Corporation for Open Systems, said Terry Lautenbach, president of IBM's Communications Products Division, during last week's Communication Networks '86 Conference. A number of IBM competitors initiated that consortium to forge open systems interconnection.

■

Unify Corp. and Convergent Technologies, Inc. last week were in the final stages of negotiating an agreement for Convergent to offer Unify's relational DBMS, Unify RDBMS, and Accell integrated application development environment to its OEM customers. According to sources, Convergent will make Unify's products available for use with its product line of Unix computers. Unify also will reportedly be used in Convergent's soon-to-be-released office automation package.

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Lotus pact changes role in DP market

By Eric Bender
and John Gallant

CAMBRIDGE, Mass. — Lotus Development Corp. last week moved to strengthen its role in the corporate data processing market, announcing plans to acquire data retrieval technology from Infocenter Software, Inc. and to develop internally a range of micro-to-mainframe products.

Lotus spokesmen said the firm has signed a letter of intent to purchase Infocenter's Ilink product and related technology for an undisclosed sum.

Once the deal is completed, responsibility for Ilink will be given to Lotus' newly formed Information Center Group. Several

See **LOTUS** page 8

DEC unwraps high-end VAX

By Donna Raimondi

Rounding out its second-generation VAX line, Digital Equipment Corp. last week introduced a high-end system, which it will market as a mainframe-class machine, and two mid-range systems that supersede its popular first-generation VAX-11 models.

The company unveiled the high-end VAX 8800 along with two mid-range systems, the VAX 8200 and 8300 [CW, Jan. 27], that effectively replace the older VAX-11/750 and 11/780 models. The new products will join the 50,000-plus VAX

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Controls key to managers' net demands

Vendor options, central management talk of show

By Elisabeth Horwitt
and Bryan Wilkins

WASHINGTON, D.C. — Increasing size and complexity in wide-area networks has made network management tools a priority item for corporate communications managers. This was the dominant concern of users and vendors at last week's four-day Communication Networks '86 Conference, which drew a record 15,705 attendees.

Typical was the comment of Joseph Fornieri, vice-president and manager of communications network systems at Chase Lincoln First Bank in Rochester, N.Y. "We're putting in a T1 network," Fornieri told a reporter, "and I'm looking at all the traffic monitoring equipment on the floor."

Conference exhibitors announced several centralized systems that represent a step forward for management technology by allowing administrators to monitor entire networks in real-time and, theoretically, spot problems before they get out of hand. Despite the new products' improvements over distributed monitoring systems, however, conference attendees were critical of the fact that they worked with only a single vendor's products.

In other conference activity, Federal Communications Commission Chairman Mark Fowler called for further deregulation of telephone services and freedom for the regional holding companies, a proposal he freely admitted would be "trashed" by pro-regulation forces. Under his proposal,

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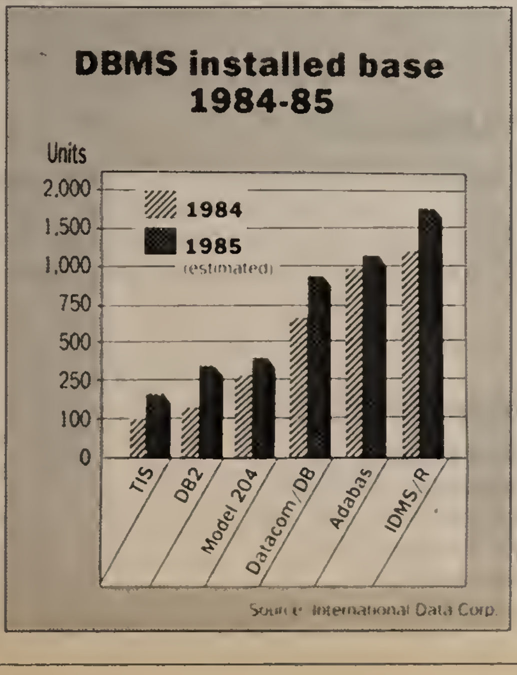
CW EXCLUSIVE

Blue horizon: Users rate DB2 high, await new version



Source: International Data Corp.

By John Gallant

In a field rife with contention, IBM's 3-year-old relational data base management system, DB2, is perhaps the most controversial topic of all. Now, as they eagerly await the rumored performance-boosting second release of DB2, early users praise the original product even as analysts decry its performance and lack of productivity tools.

DB2 watchers predict that enhancements embodied in Release 2, which may debut as early as April, could improve the program's performance by 50% to 100%. If so, IBM will have addressed one of the two primary areas of user concern (see story page 14). Additional horsepower will allow DB2 to support a greater range of applications and may mark the beginning of the end for IBM's dual-DBMS strategy — a strategy that cast DB2 in an information center role and IMS as the basis for production applications.

But while DB2 users acknowledge that the release of such development tools as a fourth-generation language and an active data dictionary will not likely accompany the sought-after performance upgrade, they said they are impressed with the relational DBMS foundation laid by IBM.

Ka-yiu Yu is typical of users carefully assessing the evolution of DB2. "We are considering replacing IMS Full Function with DB2," said Yu, vice-president, data base and data administration, for Security Pacific National Bank in Glendale, Calif. "We are testing the transaction handling capabilities of DB2, but right now we don't see any big performance problems."

See **BLUE** page 14

NEWSPAPER

Hartford spinoff, Wang unveil programmer productivity system

Application generator line boosts VS as IBM link

By John Gallant

LOWELL, Mass. — Hartford Integrated Technologies, Inc. (Hitech), a recently formed offshoot of the giant Hartford Insurance Group, and Wang Laboratories, Inc. last week jointly introduced a broad applications development product line that blends an array of proprietary and third-party programmer tools running on Wang processors with links to IBM mainframe environments.

The Solution is the fruit of a cooperative effort between Wang and a 5-year-old productivity support group within Hartford Insurance. Fully implemented in a configuration designed to support 40 programmers, The Solution's hardware, software and peripheral components cost nearly $1.2 million, or roughly $29,000 per programmer. Each such configuration includes Wang Professional Computer workstations tied to a Wang VS 85 or VS 100 hub, which can communicate with other VS nodes through Wang networking software, linked to an IBM mainframe. The IBM interfaces include Wang emulation and file transfer products.

> *'We want to invest in the MIS manager.'*
> — Carl Masi
> Wang Laboratories, Inc.

Analysts who viewed the product last week said users willing to make a substantial investment in improving productivity could benefit from automating programming functions through The Solution. For Hartford Insurance, they said, the product represents a chance to profit via Hitech from its extensive research into productivity. Hartford's efforts, which include the installation of more than 600 such programmer workstations, have already helped the company to boost the productivity of its roughly 1,000-member programming staff by nearly 30% and to trim staff by approximately 15%.

However, if the product is successful — the two companies are targeting a modest goal of fewer than 10 full-blown installations in 1986 — Wang may reap the biggest benefit. Analysts said The Solution could help the office systems giant win a more important role in the MIS world. At a press conference at Wang's headquarters in Lowell, Carl Masi, executive vice-president of sales and marketing for Wang, said, "We want to invest in the MIS manager. We think this product positions us as a supplier to MIS."

"It makes sense to off-load processes from the mainframe to a less expensive mini environment and to a cheap PC environment. But the strategy behind it is to ship more Wang hardware," said Damian Rinaldi, director of market research firm International Data Corp.'s Software and Services Information program. "It is a good opportunity for Wang to get out of the office and into MIS."

The VS acts as a repository for shared programming information and supports, among other products, Wang's office automation, high-level language and data base management system (DBMS) software and a core component of specialized development tools that grew out of Hartford Insurance's programmer productivity project [CW, June 27, 1983; May 21, 1984]. A variety of third-party programming products, including Micro Focus, Inc.'s Level II Cobol and Intech Corp.'s Excelerator, are available for the workstations also.

The setup, Hitech officials said, allows users to off-load programming tasks from the mainframe and facilitates communications and resource sharing among teams of programmers. Programs can be designed, coded and tested on the Wang hardware and uploaded to a target host.

Because a substantial portion of the software development process involves office-related functions, such as text processing and graphics in the drafting of documentation and flowcharts, Rinaldi and other analysts lauded Wang's VS and its office software as a platform for group activities. The Solution features both a design/data dictionary system that provides shared access to program components and a so-called reusable products library that lets programmers make use of prewritten code, documentation and graphics elements.

"If the product works as described," Rinaldi said, "I can envision tremendous productivity gains in the ability to reuse specifications, documentation, Help screens. The core component offers that benefit."

Analysts said the integration between the nearly 30 software products that make up a full The Solution implementation could be improved. Although a programmer at a Professional Computer workstation can access tools ranging from compilers to editors on the VS and in IBM CICS, IMS, TSO and CMS environments, the output from one programming tool does not necessarily trigger appropriate changes throughout the system.

"I think the companies are aware of the need for that kind of integration and are moving toward providing it," said T. Capers Jones, chairman of Acton, Mass.-based Software Productivity Research, Inc. "I think they are going about this in exactly the right way. Having a rich mixture of products all communicating through a common dictionary is a step in the right direction."

Asked about the role of IBM Personal Computers in The Solution framework, Jack Crawford, president and chief executive officer of Hitech and former assistant vice-president of information management systems at Hartford Insurance, said the product will support IBM micros in the future with the addition of a Wang 928 board. The Solution is scheduled to be shipped in March.

IDC's Rinaldi also called into question the product's hooks into the IBM environment. "I was very surprised to see no interfaces to standard DBMS products, which are the foundations of application development for many users. I would expect the companies to address that before they can achieve any dramatic successes."

The biggest obstacle facing The Solution, however, may well be its cost, although Hitech and Wang said they plan to make available portions of the full system that address specific programming functions.

"The first users will be the shops that have the discretionary capital — the big oil, banking and insurance companies," Jones said. "Those will be the people willing to bite the bullet — to spend, say, $25,000 per software engineer to supply the proper tools. I think it is generally agreed that programming is heavily undercapitalized."

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Development of DEC's VAX-Mate, an IBM Personal Computer AT compatible, falls months behind schedule, delaying its introduction until mid-May/ **13**

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in spite of criticism of its slow speed, inability to communicate and built-in obsolescence, the IBM System/36 still has a huge installed base/ **19**

Canaan Computer announces its DCS 5800, a 36-user, IBM VM-compatible system for middle-tier corporate computing/ **19**

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The Automobile Industry Action Group announces the final version of an electronic data interchange standard, and domestic automakers and suppliers make public schedules for implemention/ **25**

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IBM's introduction of its RT Personal Computer ends speculation that RISC technology has nothing to do with garden-variety micros/ **27**

The broad spectrum of microcomputer user needs and the variation in software form and function create a chaotic arena for micro DBMS vendors/ **27**

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IBM's unveiling of its SQL/RT relational data base management system marks a significant step in the evolution of SQL as a standard applications program interface/ **33**

Carnegie-Mellon's Information Technology Center demonstrates Andrew, a prototype software system for computer-aided instruction that was designed to be portable between Unix-based systems and whose development was linked to IBM's work on the RT PC/ **33**

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HP President John Young confirms speculation that Spectrum, the company's RISC-based machine, may not ship until the fourth quarter of this year122/

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"Corporate Unix." Despite AT&T's heavy promotion of the Unix operating system as an option for large distributed processing environments, users remain wary. By Joanne Kelleher/ **37**

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"Friendly mainframe software guides users toward productivity." Mainframe software accommodates human memory limits, motor skills, intuition and cultural orientation. The best user interfaces can interpret errors and even take a joke. By Bob Stahl/ **53**

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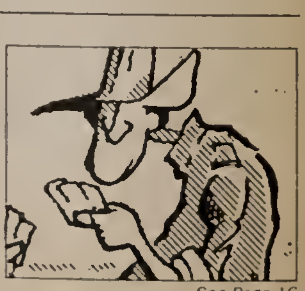
PAGE ONE CHART BY MITCHELL J. HAYES



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MIS DIRECTORS, DP MANAGERS, DATA BASE ADMINISTRATORS, SYSTEMS ANALYSTS, PROGRAMMERS:

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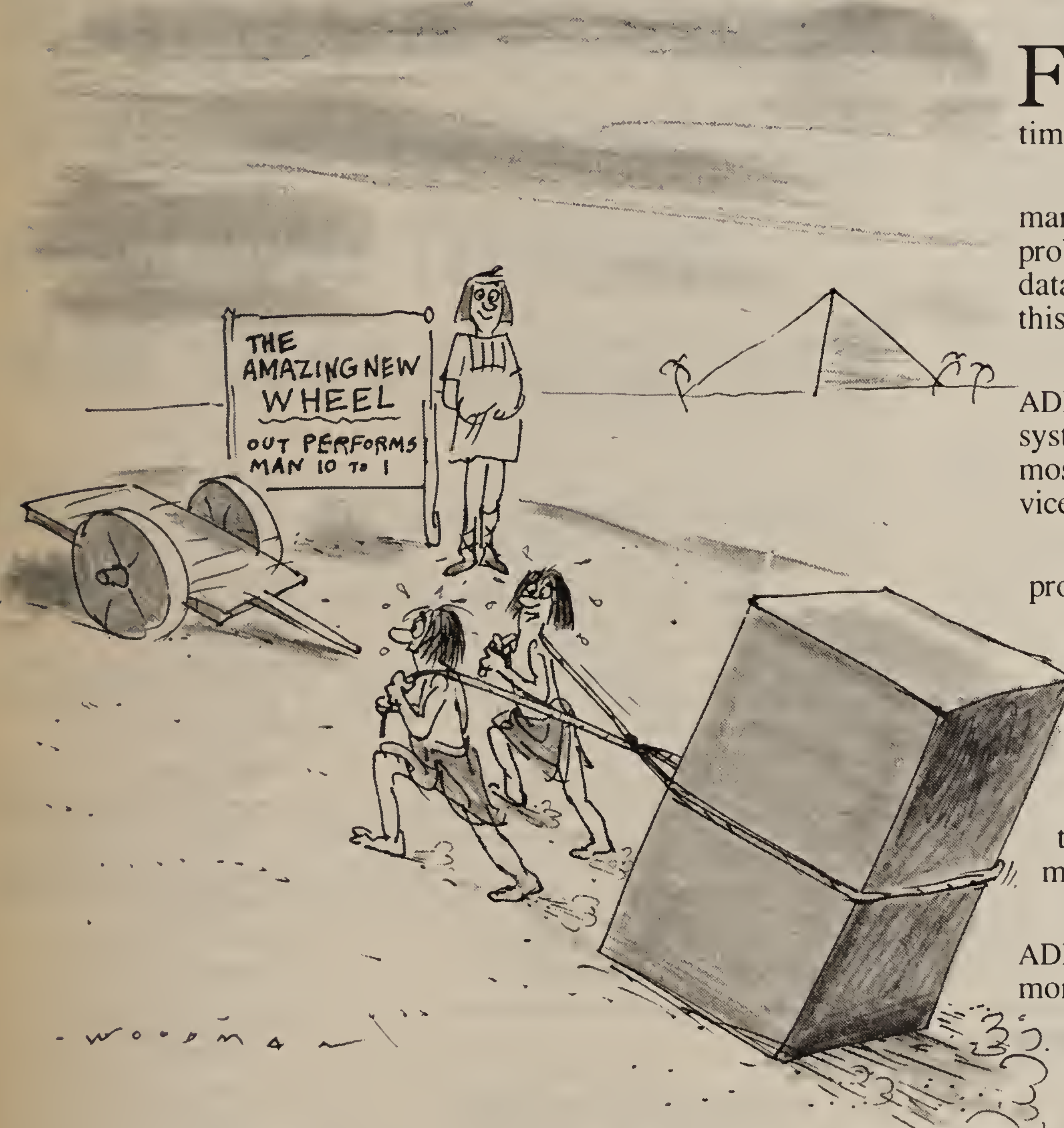
THE AMAZING NEW WHEEL OUT PERFORMS MAN 10 TO 1
Woodman

"It looks like a good idea, but let's just wait 'til they perfect it."

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Controls key to net demands

From page 1

Fowler said, "all communications services would be deregulated as to both entry and rates once an open architecture is achieved for all services."

Claiming that de facto competition will become a reality in the next decade because of the advent of new technologies, he called for a three-year trial of the plan. Fowler said the FCC is preparing to mandate that each telephone company "open its network architecture" in return for removal of local exchange rate regulation, which is the legal domain of state public utility commissions. That would allow new service providers to connect and deliver services through local telephone companies. In return, the phone companies would be free to enter competitive information service markets and enhanced computer communications markets.

The president of IBM's newly created Communications Products Division used the conference to announce that the company is urging the International Standards Organization (ISO) to certify IBM's LU6.2 as conforming to the ISO's Open Systems Interconnect (OSI). Division President Terry Lautenbach said IBM's goal is to simplify connections to its hardware by broadening access to its Systems Network Architecture (SNA).

Lautenbach acknowledged that IBM's future success in delivering products will be more difficult if it does not embrace and adopt international and national communications standards that are now being finalized at the sixth and seventh OSI levels.

In a conference address, Lautenbach said the LU6.2 interface broadens the SNA communications protocol beyond IBM's existing computer-to-computer communications and X.25 communications products. The key aspect of LU6.2 for users, Lautenbach maintained, is the fact that it separates the communications protocols necessary to establish a link among different vendors' machines from the actual interface that occurs between applications running on the machines.

IBM is urging non-IBM hardware vendors to incorporate the LU6.2 interface into their products, according to Lautenbach.

■

The network management system debate was highlighted by an address by Howard Frank, head of a Washington, D.C., consulting firm, at a session on managing a multivendor network. Summarizing the difficulties that an increasing number of businesses are encountering, Frank observed: "On one premise you have a mixture of private and public networks, integrated voice and data, satellite and terrestrial links, third- and fourth-generation private branch exchanges and hardware equipment all run by different groups, all supplied by different vendors. With the breakup of AT&T, only one systems integrator is left that can handle it all — you."

■

The real-time network management system products introduced at the Communication Networks '86 Conference were characterized by their capacity to collect traffic and line-quality statistics from modems, multiplexers, controllers and other devices and then present data in the most appropriate format — either graphs, reports or alarm systems.

The goal of the new generation of tools is to arm telecommunications managers with crucial information for network planning and problem solving. But only a few vendors, such as Northern Telecom, Inc., with its "open world" philosophy, are developing management tools that will work outside their own domain. Case Communications, Inc. was one of several exhibitors that expressed hope that they could be "one-source suppliers" to their customers.

The following is a sampling of network management products announced at the Communication Networks Conference:

■ Additions to Infinet, Inc.'s Series 90 line of centralized network management tools. The NIS 90/50, priced at $110,000, handles hybrid digital and analog networks of up to 1,200 lines. The NIS 90/40, which handles smaller networks, is base-priced at $65,000. Both systems run on a Microvax II. Performance Measurement System III software, base-priced at $49,960, is optional.

■ Northern Telecom's Intelligent Matrix 3000 Switch system collects network statistics from a range of vendors' equipment and notifies the manager of network status through graphics presentations and an alarm system. It costs $82,000.

■ Larse Corp. announced a T1 Network Diagnostic System, a centralized performance monitoring and diagnostic testing system for T1 networks, costing $2,000 per T1 line termination for five or more T1 lines at each site.

■ Keystone Technologies, Inc. unveiled Scoop, a traffic analysis and performance evaluation system that works in conjunction with Northern Telecom SL-1 and SL-100 networks. Priced at approximately $10,000, Scoop runs on an IBM Personal Computer, Personal Computer XT or AT.

■ Gandalf Data, Inc.'s Netscan 2000 software enables Gandalf-based local- and wide-area networks to be monitored from a central workstation. The DEC PDP-11/73 version costs $5,000; the IBM Personal Computer XT version costs $2,000.

■ The Maestro Network Management System from Symplex Communications Corp. collects network data from up to 506 remote sites and reports on current network status and user- and line-related errors on a four-window screen or through audio alarms. Pricing was unavailable.

TOP OF THE NEWS

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The debate over whether silicon or gallium arsenide is best for integrated circuits may be settled by a development last week at the University of Illinois in Champaign. Researchers there said they discovered a successful way to deposit gallium arsenide onto a silicon base. "Now we don't have to chose between silicon and gallium arsenide technology because we can have the best of both on the same chip," reported University of Illinois Professor Hadis Morkoc.

■

Apple Computer, Inc. President and Chief Executive Officer John Sculley was named chairman following the company's annual meeting last week. Sculley repeated an earlier invitation to former chairman and cofounder Steven Jobs to become involved someday again with the company. Jobs, through a spokesman, responded with a quote from pop songwriter Joni Mitchell: "Don't it always seem to go that you don't know what you've got 'til it's gone."

■

AT&T and Southwestern Bell Corp. last week endorsed the Electronic Communications Privacy Act, a bill pending in the U.S. Congress that would make it against the law for any unauthorized parties to obtain or alter digital communications. At a congressional hearing, AT&T's security manager called for a few minor revisions and said the bill should be expanded to cover any hacker activity that "interrupts or prevents access to an electronic communication."

■

The Federal Election Commission said last week that a 7% cut in the budget forced it to reduce drastically the amount of campaign finance data it can store on systems for public access.

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DEC unwraps high-end VAX

From page 1

machines sold by DEC since the line's introduction about eight years ago.

The new computers incorporate a backplane interconnect bus, called the VAXBI bus, that was also unveiled last week and that is built with very large-scale integrated (VLSI) technology and reportedly is more than 10 times faster than the 16-year-old Unibus used on most VAX-11 systems. The bus incorporates a Unibus adapter for customers to tie in existing peripherals.

Mike Drabicky, division analyst for Sohio Petroleum Co. in Dallas, was one of several users speculating that DEC will, over time, tie in more peripherals to the 13M-byte VAXBI bus bandwidth and will add another 8000 series system to plug the hole between the 1.9 million instructions per second (MIPS) 8300 and the 4-MIPS 8600 (see story page 7).

In a further break with the past, DEC announced an optional software rental program for the new systems.

The VAX 8800 is a high-end tightly coupled dyadic machine with the performance throughput of up to 12 times the power of the VAX-11/780 machine.

The $650,000 VAX 8800 is the highest performance VAX machine DEC has ever announced, said Don McInnis, the VAX 8800 program manager. In comparison, its former high-end 8650 machine offers six times the performance of a VAX-11/780. However, the two top machines will have different purposes, McInnis said.

The 8800 is a tightly coupled dyadic processor system that, despite the increase in power, fits in the same footprint — 15 square feet — as the VAX-11/780 or VAX 8600. The system is targeted to scientific, engineering and research markets that do intensive computations.

The 8650, announced two months ago, is still DEC's top-of-the-line machine for multiuser transaction processing or time-sharing-type applications, McInnis said, and would be used for applications such as DEC's All-In-One office system.

Three 8800 systems on a Vaxcluster equal the power of an IBM 3090 Model 200, McInnis said. The system has 32M bytes of main memory, and each processor has 64K bytes of high-speed cache memory. The cycle time of each processor is 45 nsec. The system comes with a standard Vaxcluster interface, Ethernet connections and DEC's Unibus.

■

The software rental program for the new processors allows customers to acquire software through a monthly license program, said Peter Smith, vice-president of product marketing. Customers may rent the operating system, languages, data base systems and all layered DEC software that is supported on the machines. "There is a small charge to begin the program," he added, but he did not elaborate on prices. The licensing plan is optional and will be priced according to the size of the customer's configuration.

The software rental scheme may attract customers who previously shied away from DEC because of its costly software, said Sheila Osmundsen, executive editor of Boston-based "Monosson on DEC," a publication published by Monosson Technology Enterprises. The prices will be scaled according to the processor size, she added.

■

The VAX 8200, 22 inches wide and 42 inches high, gives the computing power of a VAX-11/780 at about half its price and one-third of its footprint. It costs $79,000 in a bare box version, and typical configurations of the system range in price from $120,000 to $157,000. The 8200 is based on an eight-piece chip set and not the actual Microvax II processor; but the use of VLSI chips gives a significant improvement in price/performance, he added.

The system will kick the VAX-11/750 and the VAX-11/780 mid-range systems "out the door," according to Gartner Group analyst William Rosser, although DEC spokesmen said they will continue to produce and market those two systems. Sohio's Drabicky was similarly impressed: "When you put the 24 boards of a 780 onto one and have the footprint of a Microvax, that is pretty amazing," he said.

The VAX 8300, a tightly coupled version of the 8200, ranges in cost from $160,000 to $190,000, depending upon configuration. "The 8300 is identical to the 8200, distinguished by an additional processor board to the cabinet," McInnis said. "It gives a performance of up to 1.9 times the VAX 8200 or VAX-11/780." The 8300 has 12M bytes of main memory.

Both the 8200 and 8300 have a machine cycle time of 200 nsec, a DEC spokesman said.

The 8200 is available immediately, and the 8300 and 8800 will be ready for delivery in 60 to 90 days. Additional memory costs $3,400 per megabyte for the 8200 and 8300. No additional memory is available for the 8800.

"The new systems were scheduled, planned, run, designed and simulated by computer," DEC President Ken Olsen said during his introduction of the products. DEC used a Vaxcluster of 14 large VAX machines to design the new systems, Olsen said.

■

The VAXBI bus is the internal bus in the cabinet of the 8200 and 8300 machines that ties together the processor, the main memory and the I/O controllers. The bus is not availaible in the Microvax machines.

The bus supports up to 16 intelligent interfaces in many possible combinations and has a maximum attainable bandwidth of 13.3M byte/sec., DEC said. The 8200 and 8300 machines may be linked into a Vaxcluster by using two VAXBI bus adapter modules in the system cage and a Vaxcluster interface in an adjacent cabinet.

In the 8800, the VAXBI bus is the I/O bus of the machine, and up to four of the buses are used as I/O channels. The VAXBI is compact because of the use of its large-scale integration implementation.

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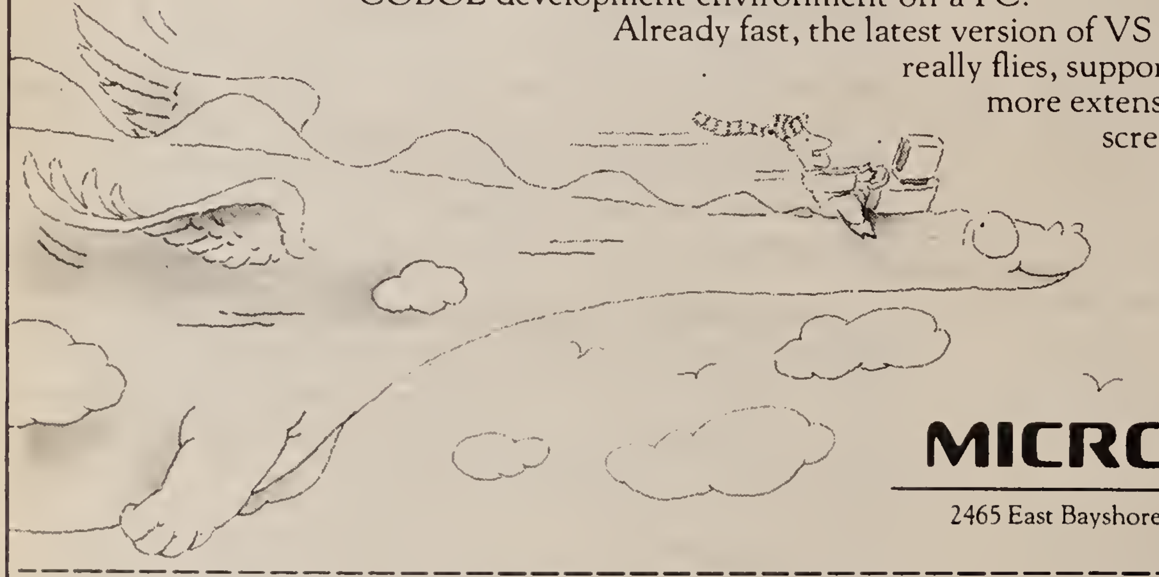

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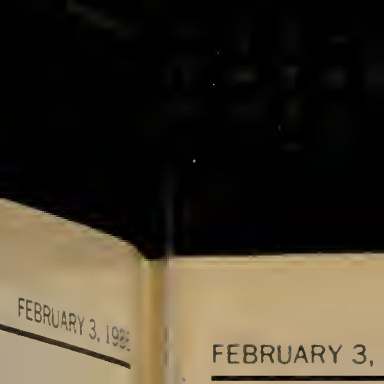

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FEBRUARY 3,

Lotus pact changes role

From page 1

Ilink developers will also move from Infocenter to the Lotus unit, where they will work on Lotus' existing Symphony Link software and future products.

"It is a strategic change for Lotus to be in the mainframe software business," noted Alexander Crosett, manager of the new Lotus group. "It shows we're getting serious about the information center."

Last week's announcement also served to highlight the difficulties that Lotus has encountered in selling its Symphony Link. Additionally, the announcement effectively terminated a joint development agreement with Cullinet Software, Inc. and apparently triggered Cullinet's long-awaited introduction of its Infogate — nee Universal Link [CW, April 1] — micro-to-mainframe offering.

Sales of Symphony Link disappointing

Sales of Symphony Link, which connects Lotus' multifunction Symphony program with IBM hosts running under VM/TSO and MVS/CMS, have been disappointing, Crosett acknowledged.

The software began shipping last summer "through the high end of the retail channel, which was a mistake," according to Crosett. Although some dealers did pursue the opportunity, "you can count them on the fingers of one hand," he added.

In October, Lotus started to sell Symphony Link through a small direct sales force. Although he declined to mention any customers, the product is under evaluation at many firms, and Lotus expects some "fairly large sales" during coming months, Crosett said.

Cullinet and Lotus were working together on a Symphony Link add-in tailored for Cullinet's Information Center Management System (ICMS), which the mainframe software vendor would sell. "But our customers told us there was no need to have two different products," Crosett commented.

Lotus customers also "kept leaning across the table and saying, 'Don't tell us you're not in the mainframe business,' " he said.

Jack Armstrong, product manager for information center products with Cullinet, said Lotus had begun design work on the add-in link but has decided to terminate the development project. Observers said that Lotus appears to be moving away from proprietary links to individual mainframe products such as ICMS.

> **"**
>
> ***'We're trying to cut a new niche.'***
>
> — Alexander Crosett
> Lotus Development Corp.

"We are not upset," Armstrong said, "Our bets were covered with Infogate. We can meet our own users' needs now. There is no anger or disappointment, but there is no knowing what might have been. Lotus has chosen to go in its own direction in the mainframe area."

Announced last spring, both the add-in Symphony Link and Universal Link/Infogate were to be shipped in the fourth quarter of 1985. Infogate links a variety of popular micro products, including Lotus 1-2-3 and Symphony, with ICMS.

Cullinet announced last week the delivery of the renamed Infogate link, which, according to Armstrong, is technically no different than Universal Link. "Everything in Infogate was announced last March," he said.

'The product now is reality'

"The only difference is that the product now is reality. We didn't like the complexity of the original name. We are trying to avoid use of the word 'link,' " Armstrong said.

The decision by Lotus to abandon the add-in link project is not the first time a microcomputer products vendor has parted ways with Cullinet. In April 1983, Apple Computer, Inc. and Cullinet announced plans to develop jointly an interface between Cullinet's mainframe offerings and Apple's then-acclaimed Lisa personal computer. By September, however, the project collapsed.

The Ilink product is designed to upload and download data between mainframe and micro applications, without requiring users to master the details of mainframe languages or protocols, according to New Paltz, N.Y.-based Infocenter.

With its hooks into a host of mainframe fourth-generation languages and other data base management software, Ilink currently offers "a very rich set of capabilities," Crosett said.

The software "stays at a very high level, even above the fourth-generation language," with a common user interface and common query methods available across multiple-vendor environments, he said. "For our customers in an information center setting, it makes an awful lot of sense for us to do things in a way that marries incompatible systems."

Lotus said it plans to upgrade the current Symphony Link with both Ilink-related enhancements and other development efforts, and the company hopes to offer a new release this year.

Tap into potential sources

Crosett emphasized the need to tap into additional potential data sources, with one example being real-time data delivered over FM radio by Lotus' Signal product. He also noted that "we intend to support other people's micro software as well.

"Our approach is something between fourth-generation language and PC products and a transactional DBMS," he said. "We're trying to cut a new niche."

In addition to Symphony Link work, the Information Center Group will apply the technology to other Lotus products as appropriate, with more offerings appearing next year, Crosett said.

Lotus will dedicate considerable resources to the effort, both in buying technology and staffing the group, which initially will employ about a dozen full-time personnel. "This year it's a start-up," he said. "In 1987, we expect it to produce quite a bit of revenue and be quite important to Lotus."

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Windows opens up micro operating environments market

Support from vendors resuscitates dying sales

By Douglas Barney

Although bedeviled by a lack of software support and technical problems, the market for microcomputer operating environments has recently begun to show signs of strength, with Microsoft Corp.'s Windows product gaining increasing support from hardware and software vendors.

Operating environments, most of which add windowing capability, multitasking and an enhanced user interface to Microsoft's MS-DOS and IBM's version, PC-DOS, have suffered from poor sales because of a lack of standardization and confusion as to the products' advantages.

Even major vendors such as IBM, which offers Topview, and Digital Research, Inc. with its GEM, have met with disappointment in this market. In a typical chicken-and-egg fashion, users have held back on purchasing operating environments due to the lack of software that takes advantage of windowing and multitasking, while software vendors have held back on the writing of these environments until sales picked up.

Vendors and analysts, however, now point to signs of life for operating environments, particularly Microsoft Windows.

Digital Equipment Corp. has hinted and sources affirm that DEC has plans to integrate Windows in its next personal computer product, dubbed VAX-Mate (see story page 13) and is also considering running Windows on its Microvax computers.

According to Jan Lewis, president of the Palo Alto (Calif.) Research Group in California, DEC could license Windows from Microsoft and write the drivers to make Windows work in a non-DOS environment such as the Microvax. Programs written for Windows would then run on the Microvax, providing compatibility with software written for IBM-compatible hardware. With such a strategy, DEC could maintain the strength of the VAX line and also run many MS-DOS applications on the Microvax or VAX-Mate, Lewis said.

Microsoft is working with a number of hardware manufacturers to port Windows over to non-Intel Corp. microprocessor-based architectures, said Richard Dill, Windows product marketing group manager. The Microvax from DEC is one possibility, Dill said.

DEC officials admitted that the firm plans to add Windows "to the existing line of personal computers, and I'm sure it will also be thrown in future personal computers," said Geoff Burr, program office manager for the personal computing systems group. As to its use on the upcoming VAX-Mate product, Burr said "I think you can extrapolate from what I just said."

Other hardware vendors such as Zenith Data Systems Corp. and Hewlett-Packard Co. have committed to offering Windows as an add-on or bundling it with personal computers.

With this growing support of hardware and software vendors, Windows has a good chance of becoming the industry standard extension of MS-DOS and PC-DOS, according to some analysts. "Windows is the operating environment of choice for the future," said Mike Orsak, a software analyst with Input, Inc., a Mountain View, Calif.-based research firm. But other analysts, like Michael Goulde with Boston-based Yankee Group, do not see a need for products such as Windows. "I'm not a Windows believer," Goulde said.

Software Access International, Inc., a San Jose, Calif.-based research firm, forecast fairly modest market penetration of all operating environments.

On-again, off-again relationship

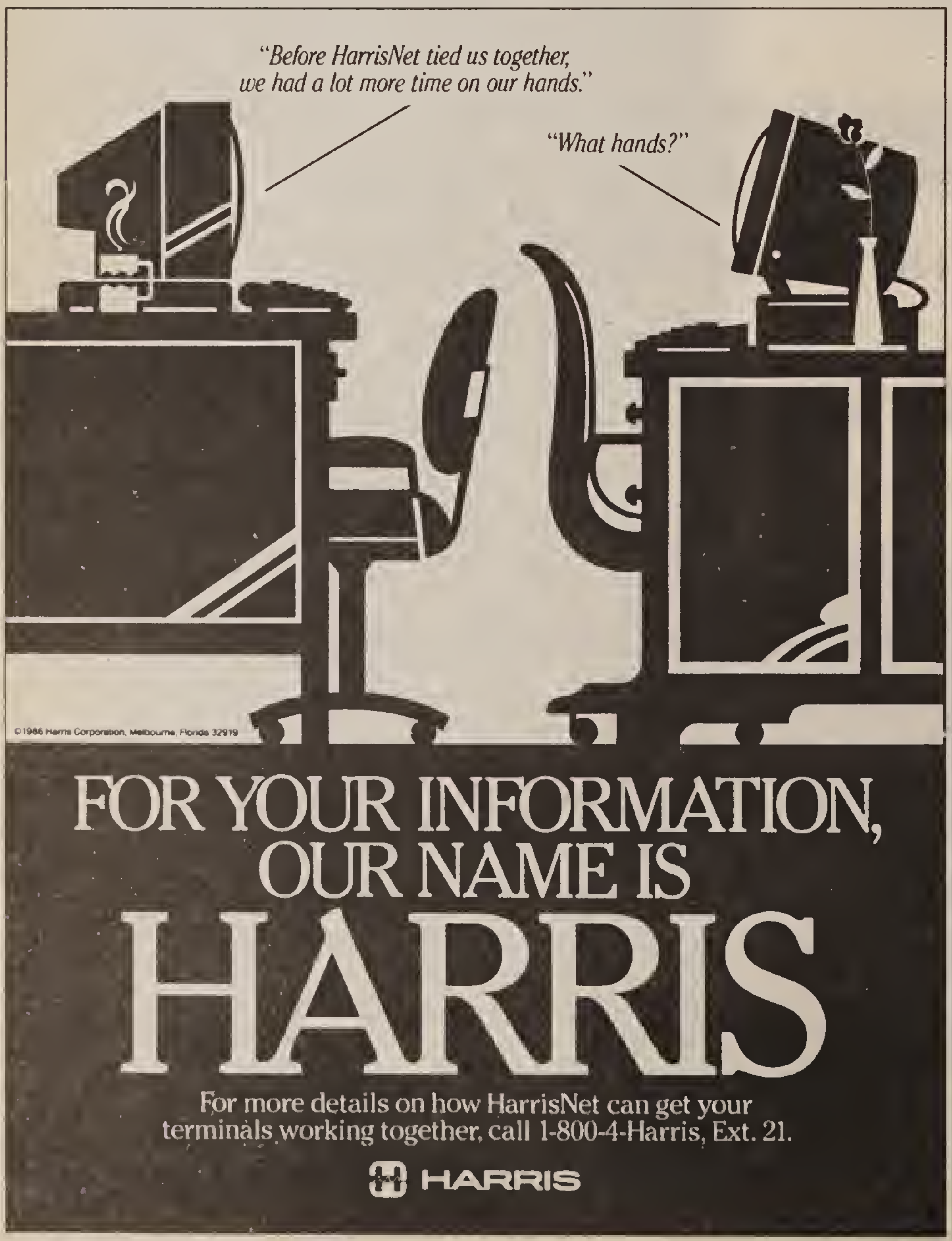
Lotus Development Corp., like many other firms, has had an on-again, off-again relationship with Microsoft regarding Windows. As Windows originally debuted in November 1983, Chris Morgan, then vice-president of corporate communications for Lotus, described the software as "an idea whose time has come." Lotus announced at that time that it would support Windows with unspecified products.

Last week — more than two years later — Lotus reiterated its faith in Microsoft Windows with a stronger announcement of support but again declined to say what products would take advantage of Microsoft's graphical user interface. Current Lotus products, such as 1-2-3 and Symphony, will not take advantage of the capabilities of Windows. Only certain products in development will be Windows based, further diminishing the impact of the Lotus announcement.

Analysts said they believe, however, that Lotus is developing both a Windows-based scientific word processing package and a scientific data acquisition package. Lotus declined comment on what the Windows-based products would be. "We are looking at a wide range of products," said Ed Belove, vice-president of corporate research and development for Lotus. Lotus will not introduce a Windows-based product until late this year or sometime next year, Belove said.

Under a licensing agreement, Microsoft is allowing Lotus to bundle portions of the Windows program with Lotus applications, thereby eliminating the need for the user to purchase Windows. However, "you can run the [future] Lotus application, but if you want to look at the Lotus application while sitting next to another application, you have to come buy the Windows retail product," said Steve Ballmer, vice-president of Microsoft's systems software division.

Although Ashton-Tate has yet to announce formal support for Microsoft Windows, analysts said they expect the firm to offer Windows-tailored products later this year.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ORACLE selected as relational DBMS by IBM for the new RT Personal Computer system

BELMONT, CA, January 21, 1986 -- The ORACLE relational database management system has been chosen by IBM for licensing on the IBM RT Personal Computer system, it was announced today. Under the terms of the agreement between Oracle Corporation and International Business Machines Corporation, IBM will market a version of ORACLE and several fourth-generation tools developed by Oracle. Under the private-label agreement, ORACLE will be called SQL/RT by IBM on the RT PC system.

This is the second such arrangement between Oracle and IBM. Three months ago, IBM announced that it would provide ORACLE under the IBM banner for its System/88 fault-tolerant computers.

Among the Oracle products included in SQL/RT and marketed by IBM on the RT PC are the SQL-compatible relational DBMS and a novice-user's interface, called Easy SQL/RT. Easy SQL/RT employs a point-and-select menu-based interface to let casual database users select and manipulate data. Easy SQL/RT users can also perform more sophisticated activities, like table creation and report generation. SQL/RT also includes an interactive command interface, a SQL precompiler for C-language programs and an online data loader for the DBMS.

According to Oracle Corporation president, Larry Ellison, "We are proud to have been selected by IBM once again as the DBMS for this IBM product line.

"We feel that IBM has a real winner with the RT PC system. We're very enthusiastic about the prospect for our products being marketed by IBM on such an outstanding new computer.

"This announcement," Ellison concluded, "further demonstrates Oracle's commitment to provide a standard solution across systems from IBM and other vendors, systems running UNIX and other operating systems, and systems ranging in size from the largest mainframes to departmental and personal computers."

The ORACLE DBMS provides a high-performance relational system across a wide range of computers and operating systems. It is marketed by Oracle and by a large number of major hardware manufacturers, including IBM, Sperry, Prime, Xerox and Honeywell. In addition to IBM's inclusion of its products in the System/88 and RT PC software portfolios, Oracle markets and supports ORACLE on IBM 43XX and 30XX mainframes with VM and MVS, and on IBM PCs with PC/DOS.

Oracle Corporation, founded in 1977, produces and markets the ORACLE relational database management system, fourth-generation software tools and decision-support software. In 1979 Oracle introduced the first commercial SQL-language DBMS. Today, in addition to the implementations on various IBM computers, ORACLE runs on DEC, DG, HP, Stratus and many other minicomputers as well as most desktop computers and micros under MS/DOS and UNIX.

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Honeywell adds configurations, enhances DPS 6 superminis

Operating system said to support IBM LU6.2

By James Connolly

BILLERICA, Mass. — Announcing performance enhancements and new configurations for its DPS 6 superminicomputer line last week, Honeywell, Inc. said a version of the line's operating system will support IBM's LU6.2 transaction processing and communications model.

The LU6.2 support, due in May, will apparently be the first on the part of the BUNCH companies, the five mainframe vendors — Burroughs Corp., Sperry Corp., NCR Corp., Control Data Corp. and Honeywell — that have traditionally offered systems that are largely incompatible with IBM mainframes. Several minicomputer makers, including Digital Equipment Corp., Wang Laboratories, Inc. and Data General Corp., have also announced plans to implement LU6.2.

Support for LU6.2 and IBM's Advanced Program-to-Program Communications are included in a version of the DPS 6 operating system, Honeywell's GCOS 6 MOD 400 Release 4. That version also supports two distributed network management facilities, Remote File Access, which provides access to remote files and devices on other systems via Honeywell's Distributed Systems Architecture (DSA), and Remote Operator Facility, which allows a network manager to use an IBM 3270 terminal to operate DPS 6 systems through an IBM mainframe and IBM's Systems Network Architecture (SNA).

"Honeywell's strategic plan regarding IBM is one of coexistence, based on selling standard Honeywell DPS 6 small systems as integrated departmental systems into networks hosted by IBM or as plug-compatibles into shared Honeywell/IBM networks," according to Honeywell spokesman Bill Bradley. LU6.2 support is intended to allow application-to-application data transfer, remote job entry, remote operation, interactive access and file transmission. Bradley said the move to LU6.2 is one more step toward implementation of SNA — not a change in direction.

The DPS 6 line ranges from the single-user Microsystem 6/10 to the DPS 6/90 series of superminicomputers. However, the two low-end systems, the Microsystem 6/10 and DPS 6/22, will not support Release 4.

Honeywell also announced performance enhancements under which memory addressability for the DPS 6 line was increased by up to four times.

Starting annual primary license fees are $1,205 for Release 4, $920 for six SNA products and $1,080 for six DSA products.

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UNIX Internals	Feb 17-20 Apr 28-May 1 Jul 7-10 Sep 1-4 Oct 27-30	Apr 21-24 Aug 4-7 Oct 13-16	Apr 14-17 Aug 18-21	Feb 24-27 Jun 2-5 Nov 17-20	Apr 14-17 Aug 18-21	Mar 3-6 May 12-15 Sep 29-Oct 2	Feb 24-27 Jun 2-5 Nov 17-20	Feb 10-13 Apr 14-17 Jun 23-26 Aug 18-21 Oct 27-30	$1375	
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Berkeley Fundamentals and 'csh' Shell*	Feb 3-7 Apr 14-18 Jun 23-27 Aug 18-22 Oct 13-17 Dec 8-12	May 12-16 Aug 25-29 Nov 3-7	May 5-9 Sep 15-19	Jun 23-27 Dec 15-19	Feb 3-7 May 5-9 Sep 15-19	Mar 31-Apr 4 Jun 9-13 Dec 15-19	Jun 23-27 Dec 15-19	Mar 3-7 May 5-9 Sep 15-19	$1225	

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HP upgrades its CPU networking

By Jeffry Beeler

CUPERTINO, Calif. — Hewlett-Packard Co. last week enhanced its local networking capabilities with the introduction of a communications software package that for the first time allows all three of its processor families to be interconnected.

HP Network Services/1000, according to HP, accomplishes for the HP 1000 series of factory automation processors what the NS/3000 has already done for the 3000 family of business processors and what the NS/9000 has done for the 9000 line of 32-bit engineering workstations.

Introduced last year, the NS/3000 and NS/9000 communications software packages allow 3000 and 9000 series machines to be integrated over a single, 10M bit/sec. link. Now, with the addition of the NS/1000, the same common network can also accommodate the 1000 family machines and permit them to communicate locally with the 3000 and 9000 lines.

NS/1000, which conforms to the IEEE 802.2 and 802.3 local-networking standards, also allows the 1000 series to be linked to non-HP processors, according to Rick Ellinger, marketing manager for HP's Information Networks Division.

For HP's other two CPU families, a similar ability to communicate with rival vendors' machines is made possible by NS/3000 and NS/9000, Ellinger said.

NS/1000, reputed to transfer data 1½ to 20 times faster than point-to-point networking schemes, reportedly complements HP's LAN/1000 Link, an interface controller that enables 1000 series processors to be tied together into homogeneous local networks. Although HP has been quietly shipping LAN/1000 Link to some customers over the past four months, the product is being formally introduced only now, Ellinger said.

Under NS/1000, each 1000, 3000 or 9000 that attaches to a common link is logically adjacent to all the other nodes of the local network — a feature that simplifies programming requirements, Ellinger said.

Licenses for the first copy of NS/1000 range in price from $2,700 to $7,000, with subsequent copies costing $1,900 to $4,900.

DEC buys into CDC affiliate

By David Bicknell
Computerworld News Service

LONDON — Digital Equipment Corp. last week acquired 50% of Systime, Inc., a Control Data Corp. subsidiary in the UK, for an undisclosed purchase price. DEC will take over Systime's service operation for DEC hardware, which reportedly has 2,500 users and accounts for one-third of all VAX systems in the UK.

DEC also announced it had dropped a lawsuit in which it had claimed that Systime had violated a DEC copyright concerning the design of printed-circuit boards.

The takeover had been opposed by a management buyout team led by Systime's field service director Harry Roberts.

Systime's service operations included all sales and field support for its DEC OEM business. In addition to its own minicomputers, Systime reportedly sold under OEM contracts almost one-third of the DEC VAX systems installed in the UK.

Systime's parent company, U.S.-based CDC, is expected to reveal year-end losses of more than $400 million. CDC reportedly gave its blessing to DEC's plan last weekend.

Bicknell is a contributor to the Computerworld News Service. He is a reporter for Computer News *in London.*

DEC VAX-Mate postponed until mid-May

Networking software delays development

By Douglas Barney

LITTLETON, Mass. — Development of Digital Equipment Corp.'s VAX-Mate, an IBM Personal Computer AT-compatible successor to the Rainbow, has fallen months behind schedule, delaying introduction of the machine until the middle of May, according to a source close to the firm's development effort.

Although a confidential memo dated Jan. 25, 1985, from the VAX-Mate development group set "a goal of having the first units [or prototypes] in the July 1985 time frame," the group ran into difficulty developing software to network VAX-Mate with VAXs and Microvaxes. "Integrating network software just takes longer than people would like for it to take," the source said. DEC originally expected VAX-Mate development to take one year, which would have meant an introduction of the product last month. DEC officials declined to discuss unannounced products.

Some analysts also foresee delays. "It doesn't look like it will be coming until the late first quarter or early second quarter," said Michael Goulde, a market analyst with the Yankee Group, a Boston-based market research firm.

The Littleton-based Personal Computer Engineering Group has been developing VAX-Mate, originally code-named PCXX, since January 1985. The group expected to have its first units appear last July, but difficulties in developing the machine's networking capability, which include close ties with Microvax computers, are responsible for the delays, sources indicate. These delays have also caused DEC to bring in additional personnel to assist in the VAX-Mate development, the source said. Originally 170 to 200 people were working on the VAX-Mate, and there are now some 250 people working on the product.

Key strength

The key strength of VAX-Mate is as a workstation for VAXs and Microvaxes that will communicate with these larger machines using thin Ethernet cable. Thin Ethernet's advantages are that it is thin, easy to string and easy to wire. The disadvantages are that it is limited in the distance it can be run and in how many taps can be put on it.

VAX-Mate will take advantage of Decnet, the source said. "It is built on top of Decnet. Decnet DOS is the underpinning product that they layered on top of to build the VAX-Mate product," he said.

"From a software standpoint, the goal is to interconnect it entirely with Microvaxes," the source said. "All your files and all your applications reside on your server," the source explained. "Anybody can build a stand-alone machine, but not too many people can announce truly integrated, networked PCs, and DEC seems to be the first major company to do that," the source said. The Microvax is the microcomputer server, and VAXs can serve as host computers, also through thin Ethernet.

VAX-Mate will employ an Intel Corp. 80286 microprocessor with an optional 80287 floating-point math coprocessor and will be completely plug- and software-compatible with the Personal Computer AT. The machine will have a 14-in. monochrome display, with a color graphics monitor available in later product releases.

The machine will run Microsoft Corp.'s MS-DOS, which is similar to the IBM PC-DOS 3.1 that the IBM Personal Computer AT uses; Microsoft's Xenix, however, which is available on the AT, will not be offered. VAX-Mate will use MS-DOS 4, the multitasking version of MS-DOS currently being developed by Microsoft, when it becomes available.

VAX-Mate will have three IBM Personal Computer AT-compatible expansion slots, one of which will be a Winchester controller slot and should come standard with Microsoft Windows and 1M-byte random-access memory, sources said. It will not be available through the retail channel.

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A DB2 wish list

The following are some of the improvements IBM DB2 users would like to see incorporated in future releases of the relational data base management system:

- Improved performance and availability of productivity tools. These are the most sought-after enhancements to DB2. In the performance realm, users said DB2's transaction handling capabilities have to be improved by as much as 100% to support the bulk of their production systems. A fourth-generation language, an integrated, active data dictionary and a report writer are among the most sought-after productivity tools.
- An on-line system monitor for DB2's companion QMF facility that allows administrators to evaluate the impact on resources of a DB2 query and, if necessary, limit or abort it.
- Improved DASD management facilities.
- Addition of audit trail facilities similar to those within IMS.
- Improved security and chargeback (billing) capabilities.
- Support for referential integrity and for additional relational data management functions.

— John Gallant

Blue horizons: DB2 users

From page 1

At Security Pacific, DB2 currently supports an ad hoc query system for the bank's trust department and a flexible benefits application used by the personnel group that maintains information on some 30,000 employees.

The bank installed DB2 in test mode in December 1984 and has had the applications up and running since last August. While the ad hoc query system is updated periodically, according to Yu, the personnel system is a production system that is updated in real-time.

Yu said DP personnel at the bank rated the performance of IMS Full Function, the version of that DBMS geared to moderately high-transaction applications, at roughly 20 transactions per second.

Security Pacific has not yet benchmarked DB2, but most analysts put the relational system's current performance in the five to 12 transactions per second range. Release 2 improvements could double those figures.

No problems with data base size

Yu and the majority of users interviewed by *Computerworld* said the company had not encountered problems with the physical size of the data bases DB2 could handle — a problem cited by many observers.

"We are quite happy with DB2," Yu said. "The installation was very easy. The code was quite clean. We have not hit the performance problems many people have cited. The potential productivity gains we foresee with DB2 have us excited."

Kenneth Paris, director of product development with Pansophic Systems, Inc. in Oak Brook, Ill., shared Yu's enthusiasm. "It's my feeling that DB2 right now is a production DBMS that is capable of handling the requirements of 95% of the MVS sites in the country," Paris said. Pansophic went on-line in August with DB2, which was unveiled by IBM in June 1983, and made generally available in early April of last year.

Paris' group is at work developing interfaces to DB2, which is running on an IBM 4381 under MVS/XA, from Pansophic's Easytrieve Plus report writer and Gener/ol applications development products.

'Major force in the MVS market'

"If the next release is a performance release, and all indications are that it will be," Paris said, "that percentage will go up. DB2 may never be appropriate for the sites that need IMS Fast Path," a version of IMS geared to supporting extremely high-volume transaction systems. "But within the next two years, almost any site should be able to use DB2 as its main DBMS. As an architecture for the future, DB2 will be the major force in the MVS market," Paris said.

In its current incarnation, according to Robert Osacky, senior systems analyst with Commonwealth Edison in Chicago, DB2 is not the appropriate product for applications beyond low-transaction volume or ad hoc query systems.

Commonwealth Edison plans to bring its first DB2 application online in March, having tested the DBMS on an IBM 3084 under MVS/XA since October.

But Osacky said the company believes IBM will soon address performance concerns and, therefore, Commonwealth Edison is targeting most of its new applications development for that environment.

"We're currently shying away from high-transaction volume applications with DB2," Osacky said. "Where performance is critical, we wouldn't commit to DB2. But we expect IBM will upgrade DB2 to handle both production and information center-type applications. I feel DB2 would need at least a 100% performance improvement to handle IMS applications."

Myles Walsh, director of data library development for the CBS Records division of New York-based CBS, agreed.

"I am sure IBM intends to improve DB2 along that line," Walsh said. CBS Records is currently putting DB2 through its paces on an IBM 3081 and is planning to implement an application that supports detailed tracking of sales activity by its marketing, finance, sales and order fulfillment departments.

"We have no evidence yet that DB2 is a weak performer. But we see the product right now primarily as a

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good retrieval mechanism," Walsh said. "As far as file maintenance and production applications, we certainly won't try anything like that for a couple of years."

If DB2's current performance is not as bleak as some observers have portrayed it, the absence of a suite of end-user and programmer productivity tools is still a salient issue with users. Relational products competing with DB2 include Cullinet Software, Inc.'s IDMS/R, Software AG's Adabas, Applied Data Research, Inc.'s Datacom/DB, Cincom Systems, Inc.'s TIS and Computer Corporation of America's Model 204. The independent vendors have provided integrated development, dictionary, reporting and query tools that DB2 now lacks. And, DB2 users reluctantly concur, IBM has not made clear at all how those yet-unshaped pieces of the DB2 puzzle will be fitted.

> *'Where performance is critical, we wouldn't commit to DB2.'*
>
> — Robert Osacky
> senior systems analyst
> Commonwealth Edison

"Those are the highest priority requirments," Yu said. "I imagine that IBM is working toward those things, but we are not sure when they will be announced. People tell us IBM is working on a dictionary system. I would like to see that and a fourth-generation language."

Osacky shared that criticism. "The other relational systems have tightly integrated applications development tools. IBM has made some attempts at that with products like the Cross Systems Product and the Application Development Facility, but they are all lacking in some respect. There is not that set of integrated tools that makes it easy to develop an application under DB2. We're hoping IBM will address that, but its hard to read the company."

Pansophic's Paris said IBM has been working with vendors, encouraging them to provide such tools for DB2 users. "IBM has realized that DB2 needs these tools. IBM has been inviting vendors in, explaining to us how they would like us to interface to DB2. IBM can't build them all in time, so they are inviting vendors like us to develop them," he said.

But even in the absence of integrated aids, users still rated DB2 a solid productivity tool by itself. Yu said that Security Pacific implemented its flexible benefits system in little more than two months using SQL statements embedded in Cobol code. "DB2 helped us significantly. It does a lot of the work for you, and it is a big improvement over working with IMS."

Overall, users seem to view DB2's future philosophically. "As we get more comfortable with the product, we will expand our use of it," Osacky said. "We are waiting for the product to mature, but we are confident it will. We are committed to relational and DB2."

WORLD DIGEST

Computerworld
News Service

LONDON — Major UK computer users, including insurance giant Legal & General Group Plc. and software house Hoskyns, are turning to politically troubled South Africa in order to ease their shortage of skilled staff. The recruitment drive is being supervised by Anthony Moxon Associates, which has placed advertisements in most of the major South African newspapers.

The ads in the Sunday edition of one Johannesburg, South Africa, daily were filled with jobs offered in Britain, Australia and the U.S. at salaries from $19,600 to $35,000 in the UK alone.

SEOUL, South Korea — Competition is intensifying between domestic and foreign vendors in South Korea's market for 16-bit personal computers.

The battle was sparked in January of 1985 when IBM established a South Korean subsidiary, IBM System Korea, for production of its 5550 model, a machine built with a number of components that were produced locally.

TSUKUBA, Japan — A computer based on the superconductivity of Josephson Junction technology came one step closer to reality this week as Japan's Ministry of International Trade and Industry announced the development of two 4-bit sequential-logic circuits that use Josephson Junction techniques.

TOKYO — Japanese, American and European vendors have reportedly reached a preliminary agreement to develop jointly an Open Systems Interconnect (OSI) protocol in order to network different brands of computers in an apparent effort to counter IBM's Systems Network Architecture.

So far, 36 leading computer companies from all parts of the world have pledged to make OSI the standard for data communications between their machines, according to a source.

TOKYO — The Japanese government, in a bid to streamline multinational exchanges of business data, is setting guidelines for private companies to win increased access to transborder data bases.

A model set of Japanese rules for transborder data flow will be presented this spring.

Japan's effort to facilitate transborder data flow was launched last fall by a 15-member research forum of specialists led by Prof. Soji Yamamoto of Tohoku University. The panel has since discussed ways of setting up a reliable system that would promote the use of international business data bases and data processing services.

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VIEWPOINT

EDITORIAL

Free enterprise on hold

For two years, AT&T and the offspring of its regional holding companies have stumbled along the path of divestiture, pushing and pulling at the limitations of the 1984 consent decree. In their latest tussle with U.S. District Court Judge Harold Greene, three of the regional holding companies petitioned for authority to offer certain new services without first asking the court for specific waivers, the method by which Greene has chosen to control the divested Bell operating companies' entry into virtually any business other than local telephone services.

Greene denied the request, and his language in the decision reflects an unfortunate and unrealistic view of the communications marketplace. He chastised the telephone companies for their "rush to diversification," which, he said, shows "that an ascent into the ranks of conglomerate America rates far higher on their list of priorities than the provision of the best and least costly telephone service to the American public."

Contrary to Greene's inference, the long-term success of the former Bell operating companies rests on their ability to expand beyond the low-profit business of bringing telephone service to our homes and into the high-profit business of bringing a full range of both voice and high-speed data communications services into our offices. Right now, for example, the telephone companies are gearing up to sell X.25 packet-switched services to customers but cannot provide the protocol conversion that could make their packet offerings competitive with the likes of AT&T's Accunet or with Tymnet, the subsidiary of McDonnell Douglas Network Systems Co.

If the intent of Judge Greene's consent decree — to replace a monopoly with free and open competition — is to be realized, the communications market must be supplied with strong and able competitors. As the regional holding companies are seven of the most promising of these competitors, placing unreasonable restrictions on them at this time runs contrary to the spirit, if not to the letter, of the divestiture ruling.

Promoting dialogue

In this week's page one "CW Exclusive," computer managers relate their experiences with IBM's relational data base management system, DB2. Users at five major U.S. corporations contributed comments. Users at five other firms were contacted, but their employers forbade them to talk.

There are good, sound reasons for companies to be very careful in how their employees interact with the media: Employees may inadvertently divulge sensitive information or say something remotely litigable. These are not, however, good reasons for closing off employee access to the press.

There are better ways for companies to deal with this situation, such as advising computer professionals on what they may safely discuss, and it is time that modern corporations begin to explore them. Sharing information is one way for computer professionals to learn, to grow and to do a better job, and it is in the interest of their firms to see that arbitrary, blanket policies do not impede this dialogue.

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LETTERS TO THE EDITOR

'Fan' defends the virtues of Multics

I am a Multics consultant and have been closely allied with Ford Motor Co. and Honeywell, Inc. over the past four years. I was deeply disturbed by the editorial "Vendor follies, user foibles" [CW, Jan. 13].

I am one of the "fans" of Multics as are most who have ever had the opportunity to work with the system. I strongly object to the contention in the editorial that any DP manager who does not follow the herd shouldn't be on the job and is doing his company a disservice by daring to grow. It is that type of thinking that has put the DP industry in the sorry state that it is in right now, where MVS and IMS reign supreme.

Granted, Ford has a big, expensive problem right now. But the sad truth of the matter is there are no other systems on the market that can do the work that Ford has their Multics systems doing with such ease and cost-effectiveness.

These are not specialty applications but very general engineering tracking and development systems. Usage of the Multics systems at Ford had been growing at a rate of about 40% per year before these threats of canceling the product started more than a year ago.

Hardware resources couldn't be purchased and installed fast enough to absorb the growth of work. The Multics systems are the least expensive systems to use and operate at the computer center.

The technology that makes up the Multics system was created 15 years ago. At that time it was the state of the art. Today, 15 years later nothing else like it exists and probably won't for another three to five years.

Multics has had a relational data base package since 1976, long before Oracle or DB2 ever showed up. Multics' DBMS is far superior in performance and features to any other on the market today.

Most people aren't aware that Unix, the current rage, is based on Multics, although it is missing some of Multics' more significant features, such as consistency; integrated, built-in security; and dynamic linking.

Applications can be brought up on Multics in a fraction of the time needed to do it on other systems primarily because of the fourth-generation tools that are inherent in its design.

Most of the "managers of Multics shops who watched as the product line stumbled along," had no intention of converting off of the system and spent quite a bit of time trying to convince Honeywell to keep and market the system. The cost-effectiveness and productivity benefits were just far too great to consider changing to more successful systems.

I think it is very easy to stand back now and say, That's what you get for going with that black sheep system. But if we all sit around waiting for IBM to tell us what the state of the art is, the DP profession will always be 20 years behind. And *that* is something we can ill afford.

John Hergert
Cutler-Williams, Inc.
Dearborn, Mich.

DBMS: One relation, under Codd

For many years, I believed that Codd's relational model of data was merely mathematics — but very rigorous mathematics, nonetheless. Now, thanks to Codd's new teachings in his two-part article "Is your DBMS really relational?" [CW, Oct. 14 and Oct. 21], I know that the relational model has ascended to spiritual heights as well. I have seen the light.

Thus, I read the article "Strained relations: DBMS debate turns bitter" [CW, Jan. 13] with righteous revulsion that certain Eastern merchants have refused, before Codd, to recant their blasphemous desecration of "the word." This sacrilege must be avenged. Let each of Codd's true followers take up the crusade of relational purity. There is only one model, sayeth Codd.

For violating Codd's commandments, each of these sinners must be punished. But, to cries of "off with their pointers!" I say, nay, let their suffering be repeating. Thus, I can think of a no more fitting punishment for these transgressors than condemning each of them to suffer, quarterly, the torments of the Wall Street analysts.

David Nelson
Garmisch-Partenkirchen
Germany

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WEEKLY.

COMPUTERWORLD

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COMPUTERWORLD

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   - 40. Wholesale/Retail/Trade
   - 50. Business Service (except DP)
   - 60. Government — State/Federal/Local
   - 65. Public Utility/Communications Systems/Transportation
   - 70. Mining/Construction/Petroleum/Refining/Agriculture
   - 80. Manufacturer of Computers, Computer-Related Systems or Peripherals
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   - 95. Vendor: Other ______
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   - E. Office Automation Systems

3317-8605

VIEWPOINT

The untold story: Real costs of personal computing

By AMY WOHL

Personal computer prices are dropping rapidly, the newspaper headlines say. Personal computers are rock-bottom bargains, the ads in every computer magazine say. Personal computer prices are expected to drop even further, the industry experts say.

Nobody loves a bargain as much as I do. And budget-weary MIS managers, fielding requests for micros by the dozens and even by the hundreds, would love a bargain, too.

But the bargains you see in the press are for the *hardware*, and the real cost of a personal computer includes much more.

WOHL STREET MINIJOURNAL

The true cost of a personal computer includes both the things you pay for initially — hardware, software and perhaps some installation costs and training — and also the things you pay for as you go along — more hardware, more software, more training, plus maintenance, support, interconnection and systems-level support. You might also want to consider the cost of time lost during the learning stages, ancillary environmental costs (new furniture, extra electrical outlets, more lighting, for example), supplies and so forth.

Computing costs not easy

Computing all this will be a little more difficult than you might imagine. Hardware and software will be useful for at least two or three years; therefore, their cost needs to be divided over this period. You may also want to look at some training and installation costs on this annualized basis. Other costs — maintenance, in-house support and your slice of some higher level system, for example — are ongoing costs and will occur on a monthly basis as long as the personal computer is in use.

However time-consuming these calculations may be, they are critical in determining the hidden costs that need to be considered in both justifying new users and applications and in budgeting for successful support.

In fact, we fell over this whole problem when we tried to console a client who had a $500,000 budget for personal computing and used it to buy 100 personal computers. By the time the hardware and some initial software had been paid for, the budget was gone, but the bills for training, troubleshooting and expanding remained. He hid those costs under an operational expenses rock (or two) and lived to fight another day.

Ever since, we've been cautioning users that the real cost of personal computing may be much higher than they imagine. A hint of this thinking has appeared in many of our recent presentations, with amazing results. Vendors demand a full accounting of the research on which our comments are based and then furiously dispute the results. End users, however, usually tell us about two more categories we should add to the list and tell us their own war stories.

This is not an argument for abandoning the use of personal computers. One could multiply the true cost of a personal computer by some fairly large one-digit number and still cost-justify it easily in many applications. Rather, this is a case of understanding what you're really going to be paying for — and being certain that it's still worthwhile. It's also a matter of understanding what numbers to put into the budget.

Recently, a smugly satisfied manager told us that he had cut $8,000 from the cost of each personal computer he buys. He's installing Apple Computer, Inc. Macintoshes now, instead of IBM Personal Computers, and he said he feels that constitutes his savings in training costs. While the IBM Personal Computers for this company's applications required significant training and learning, the Mac, with its more intuitive interface, makes the new user productive right away. (We could imagine user-friendly environments for the IBM micro and other devices that would speed training and learning, but they might require more user organization in locating them and putting the pieces together.)

It seems we had the right idea — looking at the nonhardware and software costs, but we had missed (in this case) the order of magnitude.

What's the bottom line?

■ Getting people to use (or to be able to use) personal computers is much more expensive than buying hardware and software.

■ The ongoing costs of upgrades, retraining and support far exceed the cost of the original hardware and software investment. Also, initial training costs are likely to be substantial.

■ Budgets need to be divided between initial and ongoing costs in order to avoid nasty surprises.

There is some consolation. Each new personal computer user requires much more training on his first application than on his fifth or 10th, and, perhaps more importantly, adding a user to an organization full of trained peers requires much less initial training and support because there are so many informal trainers already in place. So the good news is that some part of your costs will diminish or disappear as you add new users and new applications, and, with the development of more intuitive hardware and software (just think if the on-off switch was on the front of the computer instead of tastefully hidden), even new users may become capable much more quickly and at a far lower cost.

And that better be true, because according to our most recent survey, even the largest and most automated companies still have 65% of their workers to train.

Wohl is president of Wohl Associates in Bala-Cynwyd, Pa., and editor of "The Wohl Report on End-User Computing" newsletter.

The clone you save may be your own

By WALTER F. CUIRLE

The popular euphemism for it used to be "termination," sometimes with the added phrase "for cause" or even "with prejudice." Shoot-'em-up thrillers have given a more sinister meaning to the phrase in recent years; maybe that's why people have gone back to saying "fired" in genteel company.

In the case of a firing for cause, our first instinct is to look the other way. After the smoke clears, it usually gets pretty quiet around the office for a while. After that, the fired party then often becomes a scapegoat *in absentia*. Everything from lost memos to system crashes are "you-know-whose" fault for some time after the firing. Eventually, things get back to normal.

MANAGEMENT MATRIX

But in any dispute, no one party is entirely right or entirely wrong. No matter how much we might like to pretty it up or justify it, a firing for cause is really the end result of a conflict that the employer won by resorting to force.

There are reasons cited: Two of the more common ones are insubordination and incompetence. On closer inspection, however, the real problem often stems from personnel practices — or lack of them, since when you don't establish essential policies and procedures, they have a way of establishing themselves.

Take, for example, a small firm that designs exquisite custom widgets, using innovative techniques developed by the founders of the company. Like many small firms, it was founded on a particular product and staffed by people whose main strengths are in the technical skills relating to that product.

Survival first, policies after

Understandably, the principals are just too busy getting the firm off the ground to establish much in the way of hiring policies or procedures. Survival first, policies after is the motto. Since production is the top priority in these fight-for-survival early days, the most urgent needs, including new personnel, are in that direct technical area.

What's needed is widget engineers, good ones, and the principals are most likely to fill those needs by hiring clones of themselves, people with backgrounds and experience as similar as possible to their own.

Once out of its survival phase, the firm can pay attention to its need for skills outside the limited realm of widget design expertise. But, unless the principals took time out to establish policies and procedures for hiring at the beginning of the expansion period, those empowered to hire are likely to continue the established pattern of hiring clones.

Status within the firm becomes a function of having expertise similar to that needed in the survival phase, regardless of the job function. In extreme cases, the message comes across loud and clear that there really is only one set of skills worth having.

This kind of accidental policy-making often results in termination for incompetence or insubordination. Suppose such a firm realizes a need for marketing expertise. The widget expert doing the hiring, not sure of the qualities needed in a marketing expert but confident that widget wizards can do any lesser job, picks a candidate with a good speaking voice on the grounds that it is probably a good asset in a marketing person.

If that new hire is really mostly a widget wiz, there will eventually be a firing for incompetence when the marketing plan doesn't work. The plan is technically sweet, but the proposed products are exciting only to other widget wizards, so it doesn't meet the market needs.

On the other hand, if the new hire does understand marketing, there may still be a firing for insubordination. Anyone would get snappish in the face of the daily message that their job isn't real work, just a second-rate way of marking time until something opens up in custom widget design.

How can this sort of thing occur within a larger firm? After all, a corporate hiring policy is supposed to be a nice, safe, methodical process. Personnel screens the applicants, the direct supervisors screen the remainder and the next level of supervision or management may sift through the few who survive.

This scenario falls apart when somebody abdicates responsibility. An extreme case might be a personnel department that simply routes resumes rather than screening applicants and a manager who says to a supervisor, "You go ahead. Hire whomever you want." This establishes a tacit policy of clone hiring and can eventually lead to preventable firings.

In short, if someone is being fired for incompetence, is the problem really incompetence or just that the skills don't match the needs of the job? If someone is being fired for insubordination, could the problem really be frustration? If the problem really is a skill mismatch or frustration, how did that happen?

One way to prevent such firings is to involve several people in the hiring process and to see to it that each person has a real role to play. Direct supervisors should work with personnel to establish the qualifications needed in a candidate rather than delivering shopping lists of credentials; managers should take an active role in second or third interviews. In many cases, this simply means taking the existing corporate hiring policy seriously and following it responsibly. Two or three heads really are better than one, particularly when each thinks a different way.

Cuirle is a senior associate with Nicholas DeMaio Associates in Bryn Mawr, Pa.

VIEWPOINT

TURNAROUND TIME

Larry Long

Q *Both of our mainframe computer systems are circa 1970. We purchased three packaged systems in the late 1970s, and all are in use today. Users are vocal about their dissatisfaction with our service, yet my requests to upgrade our hardware and software are denied.*

Our current resources are inadequate to service the company's computing needs sufficiently. How can I convince management to loosen the purse strings?

I am assuming that during the last five years you have espoused the obvious and probably the not-so-obvious benefits of using state-of-the-art computing resources. I would suggest that you try making an analogy between your department's end product (information) and your company's end product.

Management personnel in the manufacturing industry understands the consequences of using outdated equipment and inefficient procedures the manufacturing. Inevitably, a low-quality product is produced at an inordinately high cost.

When this situation happens, management must confront the alternatives — shut down or upgrade.

With an information services department, the alternatives are slightly different. Realistically speaking, management must rule out a shutdown. The options usually boil down to continuing the status quo or to allocating the funds to upgrade the department. State-of-the-art hardware and software offer greater potential to provide quality information. In general, companies that continue to use dated computing resources end up paying a premium price for low-quality information.

I would suggest that you give management some concrete examples of quality information. Present a vivid verbal scenario of what kind of service they can expect in a couple of years if they continue to neglect their computing resources.

Q *Our company is in the process of writing a long-term information system plan. This is the first comprehensive plan that we have written. Problems that we are experiencing include the format and the content of a plan. Do you have any ideas on getting started?*

I recommend a three-phased approach to planning: Phase I — preparation; Phase II — the development process; and Phase III — implementation and maintenance. Of the three phases, Phase I, preparation, is the most critical. Phase II is somewhat mechanical, and Phase III falls into place if the plan in Phase II is done correctly.

During Phase I, certain preparatory activities must be performed. Critical areas to be addressed are attitudes toward MIS planning, the design of the planning methodology, organizational considerations, education of planners and key participants and companywide familiarization with the role of MIS. Before taking the first step in the actual creation of a plan, top managers must recognize an explicit MIS charter and make a commitment of their time, and perhaps resources, to the planning process. Also in Phase I, you will need to have in place some document that outlines procedures and responsibilities for MIS planning.

Failure to address these Phase I activities will usually result in a failed plan.

I recommend that two planning documents be compiled: a strategic-level and an operational-level plan. The strategic-level plan outlines objectives and strategies in each critical computing/information resources area — personnel, communications, applications, education and so on. This document should be no more than 20 pages in length. The operational-level plan describes and time-phases those tasks and projects needed to realize the strategies outlined in the strategic-level plan.

Long, president of Long and Associates, is a consultant, lecturer and author in the field of information services. If you have a question you'd like him to address, send it to Larry Long, Editorial Department, Computerworld, *P.O. Box 880, Framingham, Mass. 01701.*

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EXECUCOM

SYSTEMS & PERIPHERALS

HARD TALK
James Connolly
CW Senior Editor

Picking on System/36

For many people, it is time to once again pick on the System/36, IBM's maligned and perhaps misunderstood attempt to address office automation and departmental processing.

The pithy quotes flowed as easily as ever when IBM announced performance boosts for the System/36 during a product introduction two weeks ago when even IBM executives downplayed the minicomputer in favor of IBM's RT Personal Computer.

"Ho hum!"

"Underwhelming!"

"So what?"

Those are the typical responses from industry observers who time after time complain that the System/36 is as slow as mud, lacks communications skills and is doomed by IBM's unstated policy of obsolescence.

But if the System/36 is so bad, why do so many people buy it? Are customers so cowed by IBM's market strength that they feel they have to buy the System/36? Or could it be that the System/36 does have something going for it? There probably is an element of truth to both suggestions.

Since IBM declines to give out figures on its installed base, one can only guess how many System/36s are at work worldwide. But it is safe to assume that there are more than the 36,000 that one estimate said were installed by this time a year ago and that there may be significantly more than 100,000, as some analysts say.

Judging by their comments in the past, it appears that in the eyes of

See **PICKING** page 23

Departmental unit unveiled

Canaan adds 36-user, VM-compatible processor

By James Connolly

NEW YORK — In expectation that a new IBM 4361 departmental processor is a year away, Canaan Computers Corp. of Trumbull, Conn., tried to take advantage of that delay last week by announcing at a New York press conference a high-end addition to its line of IBM software-compatible departmental systems.

Canaan officials said that their 36-user DCS 5800, which reportedly will be ready for delivery on March 31, provides applications processing power comparable to existing 4361s at 0.5 million instructions per second (MIPS) but also has the advantages of a Motorola, Inc. 68010 I/O processor and the capability of being installed in an office environment.

The key to the DCS 5800, like its predecessor eight-user DCS 5400, is the ability to run IBM mainframe software developed under VM/CMS, according to Canaan President Ronald Ritchie. Ritchie said the system is targeted toward the middle tier in corporate computing.

Independent consultant Dale Kutnick of Wayland, Mass., commented that systems such as the DCS 5800 and the replacement for the 4361, which he predicted will be a reduced instruction set computer (RISC)-based Micro-370, will fill the tier between personal computers and mainframes.

"VM will be the departmental system of the future, although it won't be anything like what you see today," Kutnick said, noting that only certain VM instructions need to be included in a RISC-based machine and that VM's role in a departmental environment includes supervising other operating systems.

Canaan, which markets its systems through OEMs and value-added resellers, has installed only 70 of its early systems, but expects to deliver more than 200 machines of all models in 1986, according to product marketing director Richard Schreiber.

Schreiber emphasized that the 5800 is intended as an applications processor, not

See **DEPARTMENTAL** page 24

Masstor sweetens the honeycomb

By James Connolly

SANTA CLARA, Calif. — Masstor Systems Corp., manufacturer of a honeycomb mass-storage device, recently announced a High Performance Option (HPO) for its M860 system, particularly in environments using IBM 3090 processors and IBM 3480 tape drives.

The HPO is a package of hardware and microcode features designed to support 3090 and 3480 capabilities, including IBM's Data Facility Hierarchical Storage Manager (DFHSM). A Masstor spokesman said that DFHSM now will recognize the M860 as a 3480, allowing the M860 to accept data directly from disks. The company claimed that use of 3480 compatibility features can improve file access by up to 80%.

The HPO also allows use of the 3480's locate block command, under which the M860 can identify and locate requested data and the adjoining data on the assumption that the data will be needed next.

Another feature is support for IBM's 3M-byte data streaming channel architecture, which the HPO supports through two 1.5M-byte channels.

A Masstor spokesman said the HPO also allows placement of the M860 up to 600 feet from the processor in a secure environment.

The M860, with a maximum capacity of 220G bytes, uses video recording techniques to store data on tightly wound cartridges that are kept in honeycombed modules equipped with robot retrieval arms.

A basic M860 with a capacity of 55G bytes costs about $550,000. The HPO upgrade costs $50,000.

INSIDE

IBM enhanced its 5080 graphics processors when it announced its RISC workstation/**24**

NEW THIS WEEK

- Texas Instruments offers Pro CAD 286 computer-aided design system
- For more on this and other new products, see pp. 67-90.

INSTANT ANALYSIS

"We tried to get IBM to join in Ethernet, but their need to be a monopoly limited them."

— Ken Olsen, president of Digital Equipment, in response to a question on why DEC will not join the token-ring approach to networking

Prime releases pair of low-end minis targeted for offices and engineering

By Donna Raimondi

NATICK, Mass. — Prime Computer, Inc. released a pair of low-end minicomputers last week that employ desk-high, 11.3-in.-wide cabinets. The office environment systems are targeted toward general business departmental and stand-alone processing, office automation and engineering/scientific workstation environments. Both machines run under Revision 20 of Prime's Primos operating system.

The announcement is pretty much a "keep-up-with-the-Joneses" release, said George F. Colony of the marketing research and data base firm Forrester Research, Inc. of Cambridge, Mass. Prime is responding to Digital Equipment Corp.'s Microvax II and Data General Corp.'s MV2000 machines on a price/performance level, even though the new releases are not technologically close to the DEC and DG machines, Colony said.

The systems use much of the same technology employed in other Prime minicomputers, a spokesman said. Reductions in size were achieved by using 5¼-in. Winchester disk and cartridge tape units and by packaging the logic boards in the cabinet vertically.

The Prime 2450 is rated at 1.3 million instructions per second (MIPS); the 2350 is rated at 0.85 MIPS according to Prime single-user benchmark tests. The systems, which have a maximum main memory size of 8M bytes, use custom-implemented gate array logic and transistor-transistor logic technology that is said to increase circuit density and widen in-

See **PRIME** page 23

Superminis premiere from Celerity

Processors designed for science and engineering

By Donna Raimondi

SAN DIEGO — Engineers and scientists gained another couple of processors last week when Celerity Computing rolled out its Unix-based 32-bit superminicomputers.

The C1260 and C1230 systems join the 2-year-old company's existing C1200 Distributed System, released in 1984. The superminis are the size of double-drawer file cabinets and require no special cooling, the company said. They are said to be capable of supporting up to 128 users.

The superminis offer from 3.25 million instructions per second (MIPS) on the uniprocessor C1230 to 6.15 MIPS on the dual processor C1260, said Celerity President Stephen Vallender. MIPS ratings were obtained from Whetstone benchmark tests, which contained floating-point and integer calculations using single precision operations, he added. Prices range from $75,000 to about $125,000.

"Celerity seems to be doing all the right things," said International Data Corp. analyst Richard Mikita. "They have positioned the systems as compute engines for scientific and computer-aided engineering, but the systems are still scalar and traditional computing. It is a pretty fast engine with a low cost per user." He cited a cost of $18,000 to $23,000 per MIPS. Mikita pointed out that Celerity's use of Unix will give it access to a large library of software.

The company is using Locus Computing Corp.'s PC-Interface, an IBM Personal Computer data sharing fa-

See **CELERITY** page 23

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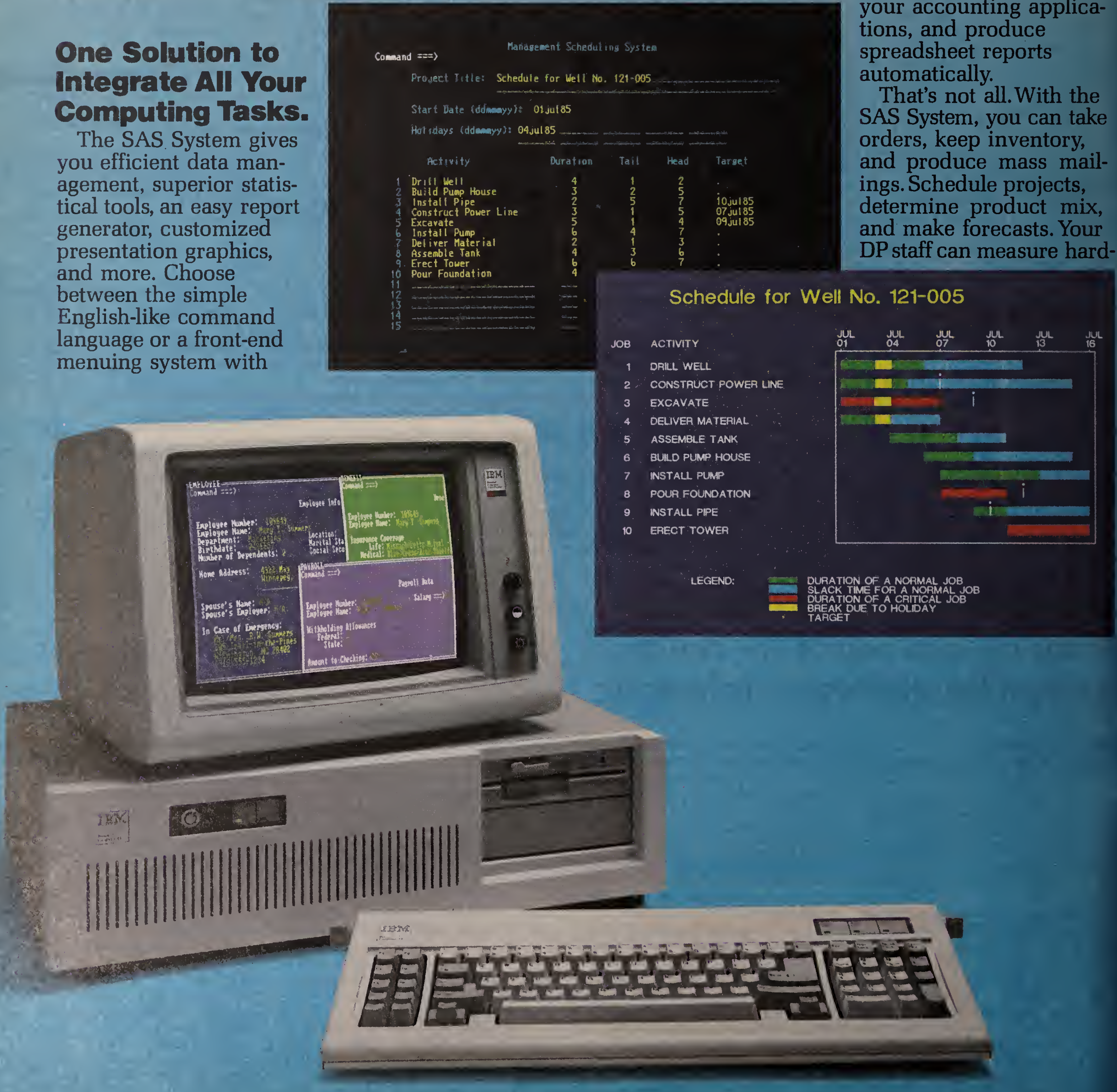

```
                         Management Scheduling System
Command ===>

        Project Title:  Schedule for Well No. 121-005

        Start Date (ddmmmyy):  01jul85

        Holidays (ddmmmyy): 04jul85

           Activity                  Duration    Tail    Head    Target

     1  Drill Well                      4          1       2       .
     2  Build Pump House                3          2       5       .
     3  Install Pipe                    2          5       7     10jul85
     4  Construct Power Line            3          1       5     07jul85
     5  Excavate                        5          1       4     09jul85
     6  Install Pump                    6          4       7       .
     7  Deliver Material                2          1       3       .
     8  Assemble Tank                   4          3       6       .
     9  Erect Tower                     6          6       7       .
    10  Pour Foundation                 4
    11
    12
    13
    14
    15
```

Schedule for Well No. 121-005

JOB	ACTIVITY
1	DRILL WELL
2	CONSTRUCT POWER LINE
3	EXCAVATE
4	DELIVER MATERIAL
5	ASSEMBLE TANK
6	BUILD PUMP HOUSE
7	INSTALL PUMP
8	POUR FOUNDATION
9	INSTALL PIPE
10	ERECT TOWER

LEGEND:
🟩 DURATION OF A NORMAL JOB
🟦 SLACK TIME FOR A NORMAL JOB
🟥 DURATION OF A CRITICAL JOB
🟨 BREAK DUE TO HOLIDAY
ǀ TARGET

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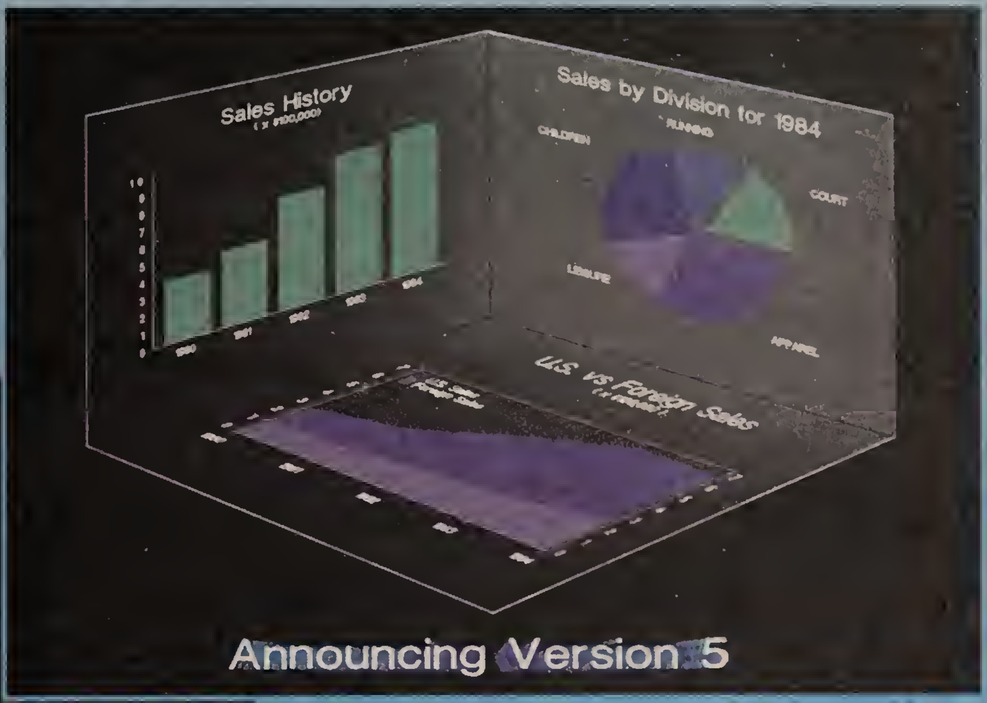

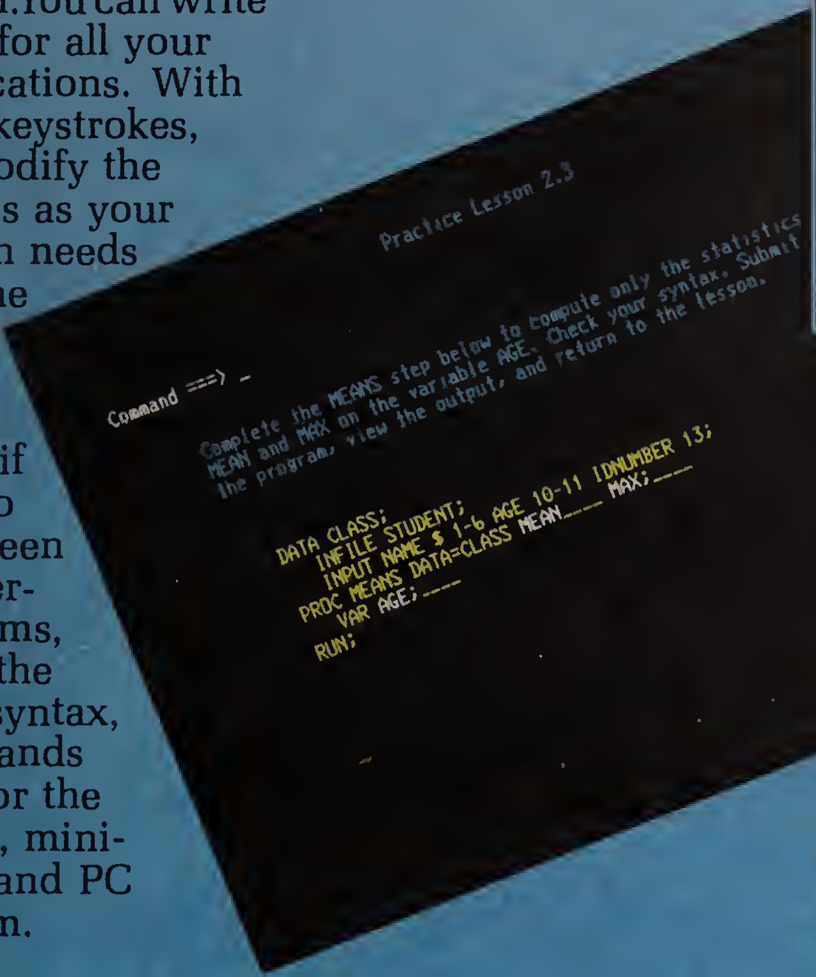

```
Practice Lesson 2.3

Command ===> _

Complete the MEANS step below to compute only the statistics
MEAN and MAX on the variable AGE. Check your syntax. Submit
the program, view the output, and return to the lesson.

DATA CLASS;
  INFILE STUDENT;
  INPUT NAME $ 1-6 AGE 10-11 IDNUMBER 13;
PROC MEANS DATA=CLASS MEAN____ MAX;____
  VAR AGE;____
RUN;
```

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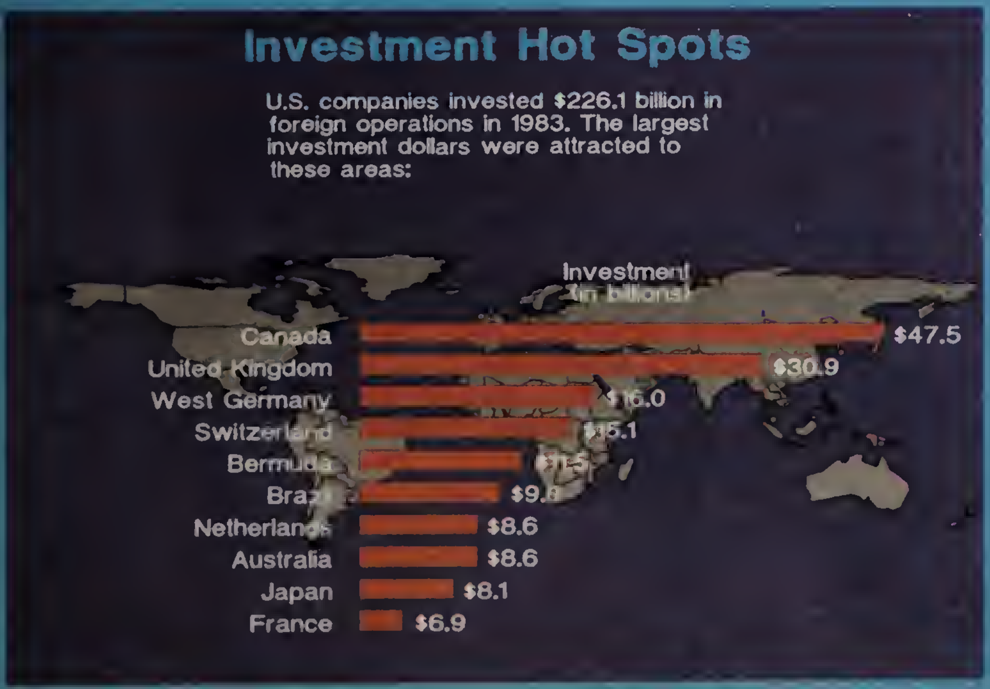

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CWD 1

Picking on IBM's System/36 unit

From page 19

many IBM customers the System/36 is imperfect and perhaps less than leading edge, but at least it is capable of doing a basic job while carrying an IBM label.

Most of the complaints about the System/36 have centered on claims that it is underpowered for work as a departmental processor. For some complainants, the situation seemed to grow worse with the most recent announcement that IBM was allowing up to twice as many connections — a boost from 36 terminals to 72 terminals in the high-end 5360 model of the System/36 — and the possibility of twice as slow response times.

To answer those complaints, IBM offered slight memory increases, additional disk capacities and a cache buffer, all of which seem to provide some degree of power but, clearly, not enough to support 72 users running highly interactive programs for a solid eight-hour workday.

Gwen Peterson, an analyst for Dataquest, Inc. of San Jose, Calif., noted after the announcement, "If you have 50 or 70 active users, you can really run into some performance difficulties. But for a lot of people, it is just as important that they have that many connections for the times that they do need them." Peterson, declining to take the easy shot at the System/36, noted that the memory enhancements, the additional user support and operating system changes are attempts to address problems and should satisfy many customers.

Another observer added that the availability of a disk cache can provide users with yet one more performance gain, even if it is not a panacea. "If you can do something with that disk cache, it can really help out," said Christopher Herron, president of Fusion Products International, a Larkspur, Calif., software developer.

A little here, a little there

The Jan. 21 announcement gave System/36 users a little bit here and a little bit there and still left open for guesswork the question of where System/36 goes now.

Herron noted that the enhancements drove the System/36 deeper into the market served by the low end of the System/38 line and that IBM's developments of higher density chips are intended to support the System/36, not the System/38.

Many observers continue to predict a new high-end System/36 introduction, with some saying that that machine, or a low-end IBM 4300 machine, will bridge the minicomputer and mainframe worlds. Will it provide the desired computing power? Will it have the necessary storage? Will it communicate or be a bridge to nowhere?

If it follows the IBM tradition of being something less than leading edge and something less than expected, it could fall short in all three areas. But even if it did just a basic job, it probably would still sell, keeping the cash flowing into IBM and leaving the pundits to mutter: "So what?" " Underwhelming!" "Ho hum."

Prime releases low-end minis

From page 19

ternal data paths in the CPU. Two-stage instruction pipelines prepare instructions for implementation. A 16K-byte cache memory is included for rapid staging and data transfer, and microcode assists single-, double- and quad-precision floating-point arithmetic.

The 2450 starts at $47,900 for a system that includes a 2M-byte memory, 16 asynchronous lines, a Prime PT200 system console with keyboard, a 60M-byte disk drive and a cartridge tape unit with 60M bytes of unformatted capacity.

The 2350, similarly configured but with eight asynchronous lines, begins at $29,900.

The 2350 replaces Prime's former 2250 system, which the company will discontinue.

A two-seat computer-aided design and drafting system based on the 2350 costs $47,310 and includes Prime's Medusa AEC architectural design software and two-dimensional design and drafting software, a Tektronix, Inc. 4111 terminal, 4M bytes of main memory and two 120M byte disk drives.

The system also includes a 60M-byte tape drive, a Prime PT100 console and a modem.

Celerity unveils two superminis

From page 19

cility, so that it can connect with IBM Personal Computers and compatible workstations. It has also adopted Sun Microsystem, Inc.'s Network File Server for sharing data located on other computer systems. The new systems are said to support up to 44G bytes of disk capacity.

The systems will reportedly be marketed chiefly in the engineering, image processing and general scientific areas. Features include a proprietary 32-bit processor and floating-point coprocessor, a reduced instruction set computer-based architecture and University of California at Berkeley's 4.2 Unix.

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```
IDENTIFICATIONS
  MODULE: Mininame
  AUTHOR: bcs
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/*program that adds first name to a file
GLOBALS
  FIXED LENGTH 1 ans
  FIXED LENGTH 15 fname
END GLOBALS

MAIN PROGRAM

  BEGIN
    CLEAR SCREEN

    USE "NAMES"
    VIEW BY "ID_FNAME" ASCENDING

    STORE "?" TO ans
    AT 23,01 SAY "Add a record ?
   Enter Y or N "
    WAIT TO ans

    WHILE UPPERCASE(ans) EQ "Y"
      CLEAR GETS
      AT 06,01 SAY "Please enter first
      name"
      AT 06,20 GET fname
      READ 1

      STORE fname TO record_name
      APPEND RECORD

      AT 12,10 SAY "Welcome to
      cENGLISH " & fname
      AT 14,10 SAY "Press any key to
      continue. ".
      WAIT
      STORE " " TO fname
      STORE "?" TO ans
      AT 23,01 SAY "Add another record
      Enter Y or N "
      WAIT TO ans
      CLEAR ROW 1 THRU 24

    END WHILE

    AT 12,10 SAY "Thats all for now !"
    UNUSE "NAMES"
END PROGRAM
```

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SYSTEMS & PERIPHERALS

Departmental unit unveiled

From page 19

as a controller or file server. He said that personal computer users who need host support seldom need direct interaction with a corporate mainframe such as an IBM 3090 and that a departmental system often will provide the necessary processing power, particularly if it runs mainframe software.

The 5800 is a 32-bit machine using Intel Corp.'s 16-bit Multibus while reportedly maintaining VM compatibility through the Canaan operating system and the IBM CMS Compatible Interface.

The company said that the 5800 runs IBM's Professional Office System, IBM's ISPF and several fourth-generation language data base systems.

Canaan enhanced its Multigate PC Plus personal computer integration product with virtual disk facilities, windows, menus, an application shell and a c user interface that can be customized. The company also announced Micro CICS, which was developed for the 5800 by Unicorn Systems Co.

The product reportedly allows IBM CICS applications development to be off-loaded from a mainframe to a 5800 for further development and testing before the applications are returned to IBM MVS and DOS environments.

Compatible with IBM, DEC

The 5800 was designed to operate on Canaan's Multigate-LAN Ethernet-type local-area network and is said to be compatible with members of the IBM Personal Computer family, IBM 3178 and 3278 terminals, Digital Equipment Corp. VT100 and VT220 terminals, Canaan's Graphics Monitor and Low Cost Terminal and other ASCII terminals.

It reportedly provides up to 8M bytes of main memory in 256K-byte modules, up to 16M bytes of virtual memory per process and up to 664M bytes of Winchester disk storage. The 5800 can be configured in four models, ranging from 12 ports to 36 ports and for prices ranging from $61,800 to $106,000, according to the vendor.

Ritchie said that the prices are end-user prices and that the company eventually plans to add end-user distribution to its OEM and value-added reseller networks.

IBM enhances graphics units for RT PCs

RYE BROOK, N.Y. — When IBM introduced its reduced instruction set computer-based engineering workstation late last month, Big Blue also enhanced its 5080 series of graphics workstations.

IBM announced two 5085 graphics processors, both of which can be attached to the RT Personal Computer, which operates as the graphics processor.

The Model 2 has 512K bytes of memory expandable to 2.5M bytes. The Model 2 allows up to 256 colors or gray shades to be displayed simultaneously from a palette of 32,768 colors and grays; it includes a 3½-in. diskette with 720K bytes of storage and is priced at $18,300.

Model 1A, which replaces the Model 1, has 512K bytes of memory and a display of 16 colors, expandable to 256 from a palette of 4,096, and is priced at $13,300.

Also announced was a feature to connect the 5080 Graphics System to the RT PC, enabling the 5080 to run in stand-alone mode.

The reconfigured graphics system and graphics processors, when attached to the RT PC, can operate in either a stand-alone mode or in distributed networks, according to the vendor.

— Charles Babcock

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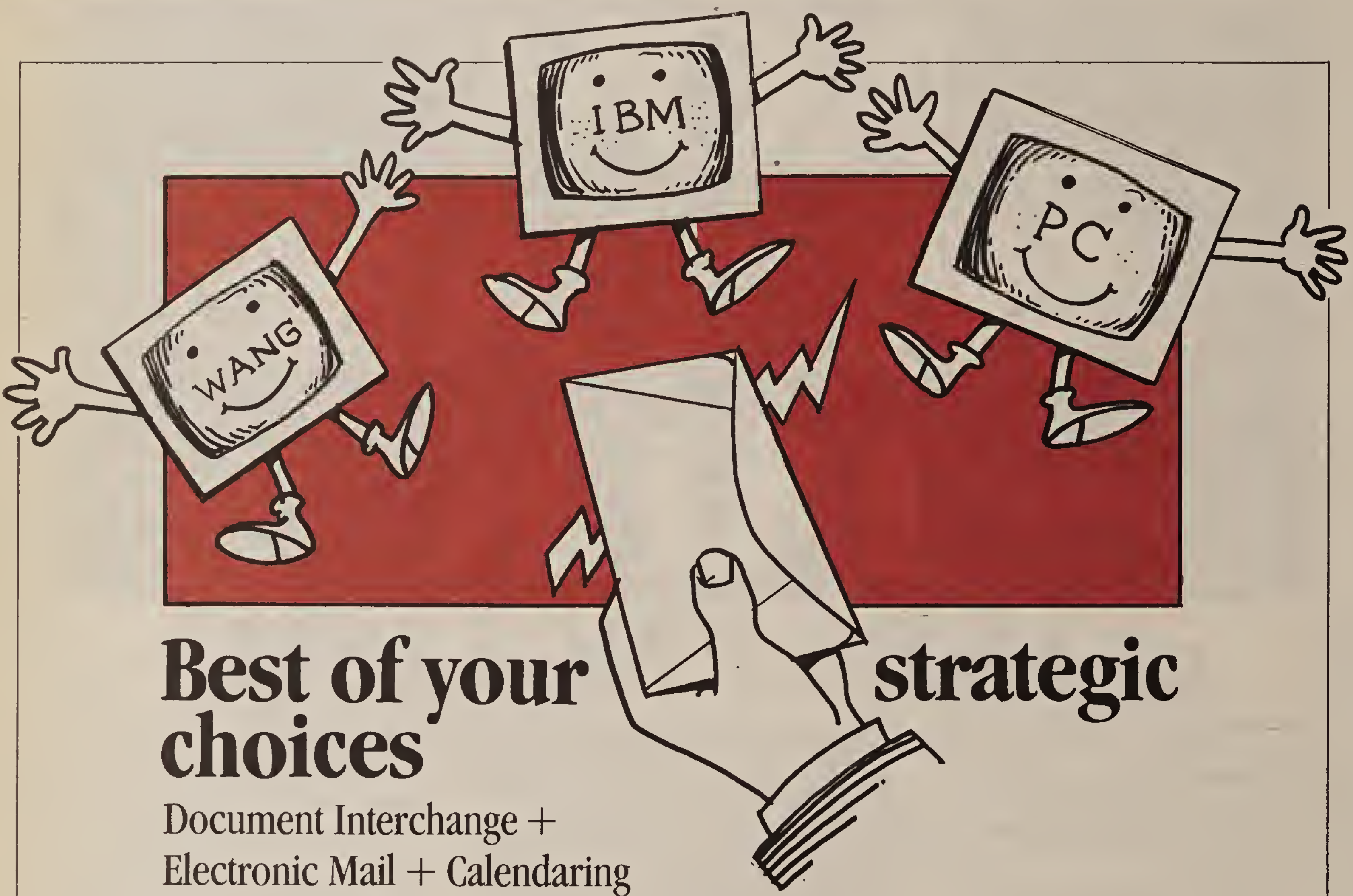

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COMMUNICATIONS

WIRE TAP
Daniel Minoli

Architecture appreciation

Network architectures are fundamental to the design of networks that can grow in sophistication as time and needs evolve. Through this column, the data communications manager should become acquainted with the contemporary view of protocols and architectures.

Three elements define computer network architectures: functions, protocols and standards. A more precise nomenclature for the latter would be "standard protocols" or "protocol standards."

Functions are the operations performed by computer and network hardware and software so that communications can take place over a network. They can be assigned to groups or layers that perform similar or related tasks.

The groups can then be organized into a hierarchical model that defines the flow of data and commands from one network function to the next. A widely implemented network model is Open Systems Interconnect, which was developed by the International Standards Organization. The model facilitates control, analysis, upgradability, replacement and management of the resources that constitute the communications system. It also makes it much easier to develop software and hardware that link incompatible networks, since incompatible protocols can be dealt with one layer at a time.

See **ARCHITECTURE** page 26

Minoli is a lecturer with New York University's Information Technology Institute as well as a full-time data communications researcher and strategic planner.

Auto industry steers toward implementing EDI standard

Accelerates drive to goal of paperless transactions

By Elisabeth Horwitt

DETROIT — The Automobile Industry Action Group (AIAG) announced last week the finalized version of the electronic data interchange (EDI) standard, which defines the protocols for formatting and sending documents between computers. At the same time, leading domestic automakers and suppliers made public their schedules for implementing the standard.

Industrywide adoption of the standard will bring companies much closer to their goal of paperless supplier-to-manufacturer transactions by allowing computers to exchange documents without the need for costly protocol conversions.

The auto industry has at least two reasons for making cost-effective electronic document interchange a high priority. First, sending documents electronically instead of manually saves an estimated $12 per document. Second, electronic links enable suppliers and manufacturers to notify each other of design and schedule changes almost instantaneously. This paves the way for more efficient production management, substantially lower labor and inventory costs and, ultimately, just-in-time scheduling.

> ”
>
> ***Sending documents electronically instead of manually saves an estimated $12 per document.***

International Harvester Co., now Navistar International Corp., implemented electronic links with its major suppliers beginning in 1980 and 1981. Benjamin Milbrandt, AIAG associate director and manager of materials systems for International Harvester, reported that the system saved his company more than $80,000 in the first 18 months and helped reduce inventory by approximately 70% since then.

The Big Four domestic automakers started setting up electronic links with their major supplers over a decade ago. But smaller companies could not afford the connection, largely because each major customer used a different set of protocols for transmitting and formatting data.

Ty Pinchback is the president of Wilson-Garner Co., a cutting tool and bolt manufacturer that has had electronic links for several years. Pinchback said, "It cost us $18,000 per format to set up facilities to receive documents from each major customer. And they also expected us to set up a dedicated CRT and leased-line connection with each of them."

Pinchback recognizes that industrywide implementation of the EDI standard will force his company to reformat its data bases one last time. But he pointed out, "Once EDI is in place, one terminal on a manufacturer's premises will be able to dial up any supplier's number, call up inventory, place orders and send releases."

The AIAG standard is just one version of X.12, a standard developed by the American National Standards Institute (ANSI). X.12 is based on an EDI standard developed by the Transportation Data Coordinating Committee, a transportation industry standards organization. Steel, chemical, banking and grocery products are among the industries that have sent representatives to the Jedi Committee, an ANSI-sponsored organization that has spent the last three years trying to resolve the differences among incompatible industry formats.

The X.12 standard is only an initial step toward trouble-free, inexpensive document interchange between companies in one industry and, eventually, between industries. Companies like Wilson-Garner, which supply nonproduction items such as cutting tools that are generic to an industry — as opposed to production items, such as doors and fenders, which are specific to one manufacturer — are clamoring for standardization of the identification

See **AUTO** page 26

NEW THIS WEEK

- Touchstone Software modifies its PC Works software application to run under AT&T's PC/PBX Connection
- For more on this and other new products, see pp. 67-90.

INSTANT ANALYSIS

"The markets we are in are at the heart of the emerging information age. . . . We should continue to demonstrate our leadership over the long term."

— AT&T Chairman Charles L. Brown, commenting last week on the company's financial performance in 1985

MAP mart rivalry intensifies as two vendors sign with big-name partners

By Rosemary Hamilton

The competition between two small vendors of Manufacturing Automation Protocol (MAP)-compatible products — Concord Data Systems, Inc. and Industrial Networking, Inc. — has intensified in recent weeks as each has signed on big-name vendors as development partners.

Both Concord Data and Industrial Networking make local-area networking products for the factory environment that are compatible with MAP, which was established by General Motors Corp. and based on the International Standards Organization Open Systems Interconnect model.

So far this year, Industrial Networking has hooked up with IBM [CW, Jan. 20, 1985], and Concord Data has teamed up with Digital Equipment Corp. and Honeywell, Inc.'s Manufacturing Systems Division.

"It's become a 'who can one-up the other' situation," said Eric Arnum, data communications analyst at International Resource Development, a market research firm in Norwalk, Conn.

While Anthony Helies, president of Concord Data, and Joseph Schoendorf, president of Industrial Networking, said they are not trying to one-up each other, they also took the opportunity to point out their own advantages in this market.

"Concord was the first in the business," Helies said. "What I see now is a very healthy and good situation. There's a lot of business out there." Meanwhile, Schoendorf said, "'based on the contracts we have in place, we have a strong legitimate claim to make as the industry leader."

Some analysts, including Arnum, had expected IBM to select Concord Data instead of Industrial Networking for its MAP development project announced in January. In September 1985, IBM announced that Concord Data would supply MAP-related products for its MAP pilot project at the company's circuit board plant in Endicott, N.Y.

Helies would not confirm or deny if the company had competed with Industrial Networking for the latest development project. "We view IBM as a customer. It's a very big company. I'm not in a position to comment on all their agreements," he said.

Schoendorf said he found it hard to believe that Concord did not compete for that business, but added, "IBM does business in such a way that you don't always know who you're competing with."

An IBM spokeswoman, acknowledging that the company has done business with both Industrial Networking and Concord Data, said none of it means an endorsement for either company.

Marsha Brooks, an analyst at International Data Corp. in Framingham, Mass., said it is too soon to tell just what significance the Industrial Networking and Concord Data agreements will have. "What's developing is two teams — IBM and Industrial Networking and Concord Data and their vendors," she said. "While it's nice to have the IBM account, Digital Equipment Corp. still has more devices on the factory floor."

EDI 1985 mart estimated at $38 million

Could grow 100% per year for next five years

MOUNTAIN VIEW, Calif. — A report published in December by Mountain View-based research company Input, Inc. estimated the 1985 electronic data interchange (EDI) market at $38 million and predicted that it would grow approximately 100% per year for the next five years. EDI refers to electronic communications links that carry invoices, shipping notices, manufacturing change orders and other business transactions between suppliers, manufacturers and distributors.

According to Input senior consultant Victor S. Wheatman, the market is made up of two types of players. Vendors like EDI, Inc. and APL Group, Inc. sell protocol conversion software that enables two incompatible systems to exchange documents. Value-added network companies like Tymnet/McDonnell Douglas Network Systems Co. and General Electric Information Services Co. offer conversion software on their packet-switched nets. They also provide electronic mailbox facilities for firms that cannot cost-justify setting up EDI systems on their own computers. For instance, General Mills, Inc. sends invoices to and receives orders from its distributors through Tymnet's electronic mail service.

Input's optimistic predictions for EDI market growth in the next five years are based on the fact that a number of industries are just getting into electronic document interchange and on the assumption that it will take approximately half a decade for there to be industrywide adoption of the American National Standards Institute's proposed EDI standard. Until the standard is implemented on a majority of companies' data communications and data base systems, Wheatman said, protocol conversion software vendors and value-added network companies will continue to prosper in the EDI market.

— **Elisabeth Horwitt**

Auto industry embraces EDI

From page 25

numbers that designate a part or product in a manufacturer's or supplier's data base.

"Each customer has a different ID number for any given part," Pinchback explained. "Right now our data bases have a quarter of a million items, because the same part appears several places under different ID numbers. If every manufacturer used the same ID number for the same part, we could cut the number of data base items down to 20,000."

An ANSI committee, organized in October 1985, is just getting started on this problem.

Architecture appreciation

From page 25

The use of layers in designing networks and applications is strongly recommended.

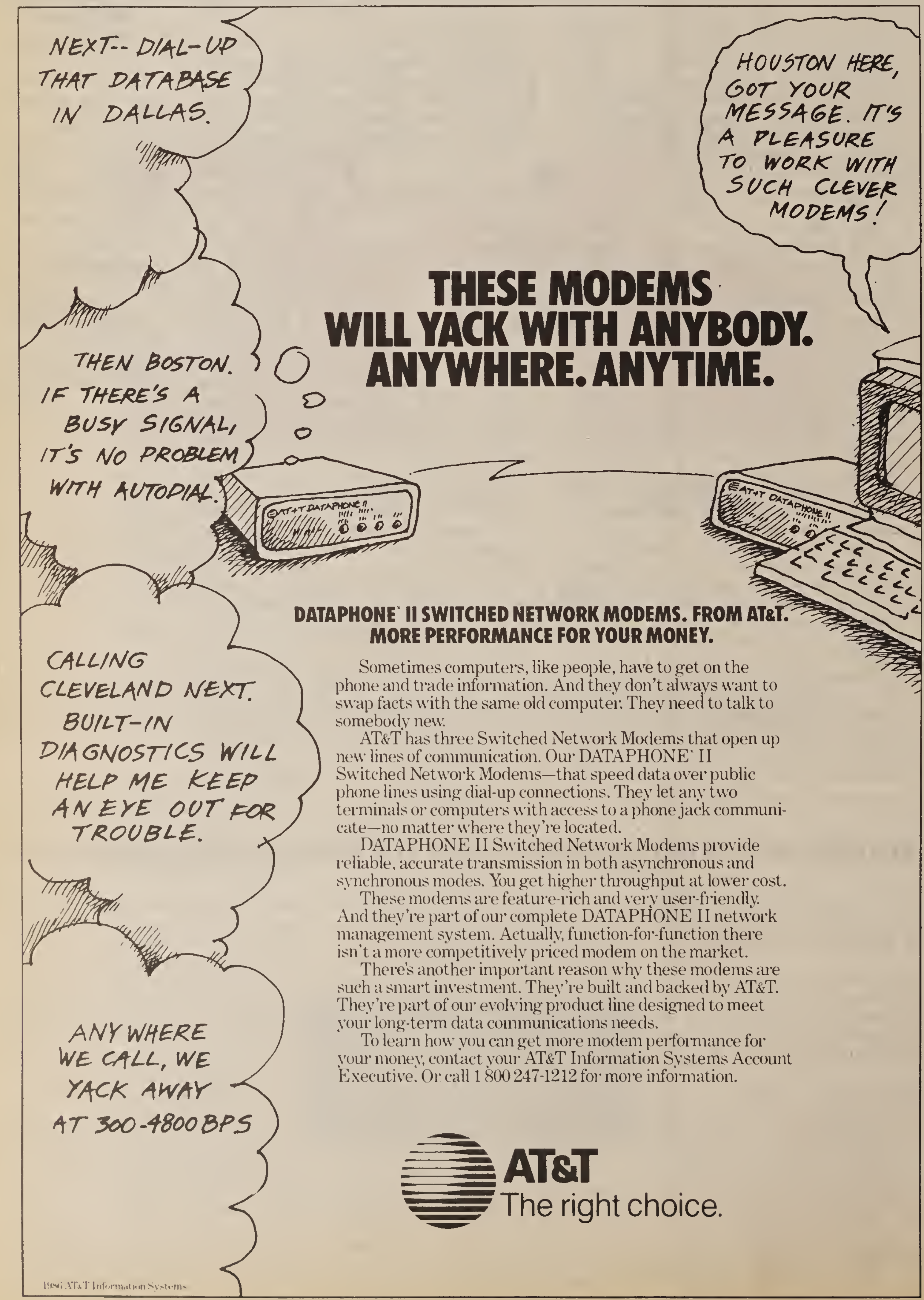
Data communications protocols are agreements between two entities on how to carry out a given function, particularly when data or commands are to be exchanged. The entities could be software programs, hardware elements or human operators.

Data communications standards are protocols that have been agreed to by a large body of pertinent industry entities. Standards can be developed by committees made up of companies from one industry, for example, the Automotive Industry Action Group; computer manufacturers, for example, the Electronic Industries Association; carriers and Postal Telephone and Telegraph organizations; foreign governmental agencies such as the Consultative Committee on International Telephony and Telegraphy; pseudogovernmental agencies such as the ISO; industry practitioners, for example, the Institute of Electrical and Electronics Engineers; or U.S. government branches such as the National Bureau of Standards.

The way in which network functions are defined and allocated among network resources as well as the manner in which different network levels communicate constitutes a given network architecture.

A layered approach to computer communications offers the following benefits:

- Network software and hardware engineers can more easily and effectively allocate tasks among network resources.
- Network managers can more effectively assign responsibilities within their departments.
- It is easier and less costly to replace any network layer with equivalent products from another vendor or to upgrade a network's capacity or functionality.
- The network can be converted to international and industry standards, layer by layer in a progressive fashion, as the standards become available.
- Many network functions can be off-loaded from the host machine and into a front-end communications processor.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MICROCOMPUTERS

SMALL TALK
Eric Bender
CW Senior Editor

Minimizing IBM's RISC

When rumors of a reduced instruction set computer (RISC) IBM *Personal Computer* began floating around a year ago, they were followed by a certain amount of giggling. What could RISC architecture have to do with garden-variety micros? The very idea was ludicrous, as one of *Computerworld*'s sister publications editorialized.

When IBM unleashed the RT Personal Computer upon the world two weeks ago, the machine ended all that speculation, although it furthered the impression that the feverish minds behind IBM product strategy would ignore no conceivable half-Personal Computer hybrid. (Can a fault-tolerant Personal Computer be far behind?)

The RT PC follows some long-standing IBM traditions, the first being that the CPU is incompatible with any existing hardware. In this case, however, one can't fault IBM for reinventing the wheel; there's no other way to shift toward a jazzy new technology.

In a second familiar tradition, the RT PC's Advanced Interactive Executive (AIX) operating system is sort of compatible with previous offerings. ("Do we like Unix standards here? Absolutely? We've got *dozens*!")

However, the flood of third-party applications suggests that porting software to the RT PC is a manageable task. "It should be fairly simple to move to that version of AIX," commented International Data Corp. (IDC) analyst Ann Morley. "It's bits and pieces of software that people have seen before."

Following a third IBM habit, the RT

See **MINIMIZING** page 29

Users' varied needs keep micro DBMS mart unsettled

By Eric Bender

At first glance, the microcomputer data base management arena seems unnecessarily chaotic. Ashton-Tate dominates the fight, but dozens of smaller firms have carved out their own territory, and high-profile start-ups keep piling in. So where do all these vendors see their chance?

Although the installed base for Ashton-Tate's Dbase family is climbing toward a million, the software has never become the kind of corporate standard that Lotus Development Corp.'s 1-2-3 represents in spreadsheets. And as micro DBMS technology keeps evolving to address an incredible range of jobs, many contenders see a wealth of opportunities among those jobs.

Corporate customers "have been quick to set a standard for spreadsheets, which is Lotus, and pretty quick to set a standard for word processors," noted Richard Rabins, president of Alpha Software, Inc., a DBMS supplier. "When they come to data bases, they're much more nervous about setting a standard. It's still very much up for grabs."

Rabins added that the tremendous variety of user demands, which pose some serious and unsolved technical problems, are preventing the market from settling down. "If you think about the three big applications on micros — spreadsheets, word processing and data base management — spreadsheets and word processors do relatively well-defined tasks. Data base management is a much broader category and, intrinsically, much more complex."

Micro data base management software varies tremendously in form and function — from the straightforward single-user file managers exemplified by Software Publishing Corp.'s PFS:File to multiuser local-area network software with relational capabilities and strong application development facilities.

And the programs address a similar breadth of users, from computer novices

See **MICRO** page 28

Local networks for micros still in infancy

Major suppliers of micro data base mangement system software are making the transition toward local-area network versions. These, it is commonly agreed, represent "the coming of age of DBMS on micros," according to David Hull, Ashton-Tate's director of product marketing for data base products.

However, most potential buyers are still at the tire-kicking stage, remarked David Feldstein, vice-president of Information Builders, Inc.'s micro products division. While his firm is among the host of suppliers that introduced a net version in the past year, "we haven't pushed that too heavily yet," he said.

"Local networks are a tough environment — anything but user-friendly," he added. "They are so difficult to get up and running, and there are so many ways to configure them."

And different network DBMS programs handle multiuser tasks in different ways. Dataquest, Inc. analyst Paul Cubbage cited the example of a user who retrieves a file, holds it for several days and then sends it back to the server. Microrim, Inc.'s network Rbase will let the user know if the data has changed in the meantime, but Ashton-Tate's Dbase III Plus will not, Cubbage said.

Users also are encountering some net performance limitations that may surprise them. While setting up an application on an IBM PC Network, one software consultant found that each workstation had to be equipped with a hard disk to deliver the application software, because the network system software is so slow.

— **Eric Bender**

NEW THIS WEEK

- Apricot offers the Xen personal computer
- Grolier Electronic Publishing introduces a compact disk read-only memory encyclopedia
- For more on these and other new products, see pp. 67-90.

INSTANT ANALYSIS

"How about some data communications?"

— Del Yocam, executive vice-president, Apple Computer, Inc., on what represents a higher development priority than color screens for the Macintosh

CDC revives Visi On integrated windowing software tool

Marketed as interface rather than stand-alone

By Douglas Barney

MINNEAPOLIS — Visi On, the integrated windowing software system originally developed by Visicorp, will be reintroduced this month by Control Data Corp. Although Visi On can be used as a stand-alone product for personal computers, the product will be sold mainly as an interface between personal computers and CDC's management applications systems running on mainframes and departmental minicomputers.

Visi On, an applications manager that works with a set of applications, was first shipped by the now-defunct Visicorp of San Jose, Calif., in December 1983. The product suffered from poor sales due to product glitches, large memory requirements and a high price and was sold to CDC in August 1984. Visicorp retained the rights to market Visi On through the computer retail channel but was itself sold to Paladin Software Corp., which now operates under Chapter 11 of the Federal Bankruptcy Code.

CDC will sell Visi On for $150 per package and will offer the Applications Manager and five different applications. Karen Wendt, national sales manager of Visi On's Business Information Sevices Division, declined to specify what applications will be available.

While Visicorp emphasized the stand-alone capability of Visi On, CDC will sell it to serve as an analysis tool that works in conjunction with the firm's mainframe- and minicomputer-based decision support software, such as Marksman. "Users can download data from the mainframe and use the PC to do additional processing. It gives you a set of tools that can additionally massage that data," said Wendt.

In addition to working with software on larger systems, CDC will position Visi On to work with other microcomputer software packages. "Ideally, you would want to continue to use Lotus 1-2-3 but bring that data into the Visi On environment. That facility will be in the new release," Wendt said. "We have positioned it as a value added to existing products," such as Lotus Development Corp. 1-2-3 and Ashton-Tate Dbase.

Visi On will be sold through CDC's field sales force and the firm's telemarketing services in Minneapolis and offered to OEMs.

Visi On will not be sold through the computer retail channel, and CDC said it will target users in large corporations. "We really believe that Visi On has a place specifically in the Fortune companies at the business professional level. Ideally, we would like to see it take a nice share of the market," Wendt said. The firm is considering site licensing, she added.

Because CDC has modest plans for Visi On, analysts said they expect those goals will be met. "They definitely have a shot at success. It all depends on the performance of the product," said Mike Orsak, an analyst with Input, Inc., a Mountain View Calif.-based market research firm. "This will help extend the appeal of Control Data's decision support software to users who are less familar with computers and decision support software."

Visi On runs on IBM and compatible personal computers and requires 512K bytes of random-access memory, a mouse, a hard disk drive, a color graphics adapter and color monitor.

Micro DBMS mart unsettled

From page 27

who want to create mailing labels or handle a handful of customer records to veteran programmers building sophisticated transactional applications for thousands of records. "It's a continuum," said David Hull, Ashton-Tate's director of product marketing for data base products. "The challenge is to come up with a package that addresses the spectrum."

Ashton-Tate and Microrim, Inc. lead the list of vendors that claim their software can address the data management needs of all micro users throughout a company — a claim that receives a good deal of sniping from other vendors.

"Large corporations are basically looking for one package on which to standardize," Hull maintained. As in other micro applications, standardization could ease transfer of data throughout a firm and simplify support and upgrade requirements.

A gap in the DBMS spectrum

But the general industry consensus is that there is still a huge gap between these two ends of the DBMS spectrum and that high-end DBMS packages originally designed as development tool kits, like Dbase, may be needlessly complicated for many users. Supporting this thesis, another source at Ashton-Tate estimated that 70% of Dbase users employ the software for file management only.

"You've got to have a minimum of two levels of data base software," said Elliot Goldberg, president of Goldata Computer Services, Inc. "I sometimes hear from MIS that they will set up Dbase as a standard. I ask them, Don't you mind that every application you do has to be programmed?"

However, at least in some cases, standardization on a micro package could bring substantial benefits, simplifying support requirements, said Dataquest, Inc. software analyst Paul Cubbage. "Both sides of the argument make sense."

But Cubbage cautioned that users with extensive micro DBMS needs should not standardize too quickly. Traditionally on multiuser systems, with almost all applications running on top of a DBMS, DBMS software has represented "a choice that's going to affect you for the rest of your life," he pointed out.

"It's reasonable to tie like functions together with some sort of standard," said analyst Maureen Fleming of the Digital Information Group in Stamford, Conn. "For example, in taking and fulfilling orders, it would be a good idea to have all the people tied into one data base manager. . . . But you can't solve everything with a single application. One DBMS is never going to be appropriate."

The main reasons, she continued, are the mix of capabilities that may be required and the difficulties users have in grasping the logic underlying the way computers store and retrieve information..

"I've never seen a DBMS that wouldn't give an experienced programmer pause," Fleming commented. Truly understanding data bases "requires a great deal of thinking," she added. "Boolean logic, which is the basis of querying information, is not always intuitive at all."

Application generation

These difficulties are demonstrated by the limits of tools for application generation by nonprogrammers.

"Everyone's trying to deliver on that," said David Feldstein, vice-president for micro products at Information Builders, Inc. "For simplistic applications — put raw data in, get it out in a form and look at it — you can do it today, but not in the way the customer wants to see it."

Users need far more than a menu-driven approach to writing programming language; they want to be led by the hand toward optimal ways of structuring and retrieving their data, Alpha's Rabins said.

While applauding one offering — Microrim's R:Base 5000 Application Express — said to let nonprogrammers generate applications, John Polick senior consultant in charge of micro practice at the Chicago accounting/consulting firm Friedman, Einsenstein, Raemer and Schwartz, said, "I'd like to see it do more complicated programming."

"The application generator right now in R:Base just acts in pulling together menus and screens and reports," Polick said. "To do anything very difficult, you've got to go in there and write the code."

Microrim Chairman Wayne Erickson emphasized the need to address both extremes of technical skill, without leaving a huge gap in between. "Let's not put Cobol and PFS in the same box."

Another requirement for high-end DBMS software is a "relational" label, although that label may not mean a great deal, experts agreed. .

"Today, everything's not only 'relational' but 'fully relational,'" Erickson noted, tongue in cheek. He pointed out, though, that fully relational means not only that the software understands multiple relations, tables and files but also enforces validation and consolidation rules. This guards against, for example, users ordering parts that do not exist.

"The major way you make a data base relational is to buy a whole lot of stickers and put them on the boxes," Cubbage joked. More seriously, he added that vendors are moving together here, with some adding relational features and "the relational people adding underlying things to make their packages run faster."

In addition to polishing local-area network versions (see story page 27), suppliers are broadening their hooks

See **MICRO** page 29

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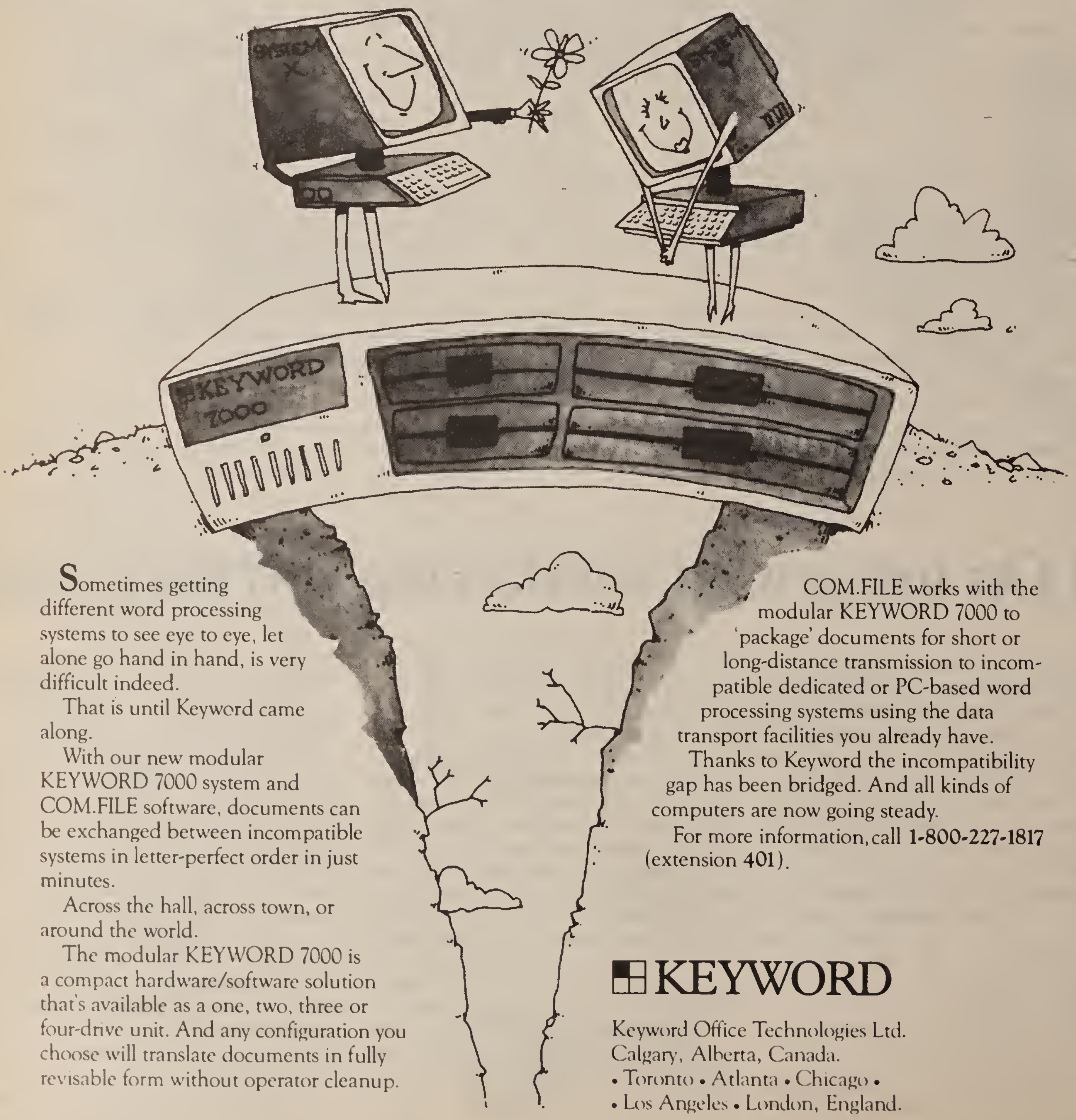

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Minimizing IBM's RISC

From page 27

PC offers fewer million instructions per second (MIPS) per buck than do smaller systems. Crunching along at 1.6 to 2.1 MIPS, the RT PC can be expected to handle computation-intensive tasks about twice as fast as a Personal Computer AT, according to IBM. But the cost is typically at least triple the AT's price tag.

There's usually a caveat on this kind of comparison: the larger system features greater I/O capabilities and expansion features and whatnot. But the caveat doesn't apply here, because from this perspective the machines are essentially identical.

That realization finally dawned while we were wondering why the RT PC's technical descriptions barely mentioned the subject of connectivity. The answer: For communications hardware, this is simply another Personal Computer. You just plug the standard add-on equipment into the AT-style expansion slots. (The software situation is considerably more complicated.)

And, of course, the RT PC reinforces the grand Personal Computer strategy with the optional Intel Corp. 80286 coprocessor. As with all the other hybrids, customers can run at least some mainstream IBM PC-DOS software and take advantage of that standard bus.

One final point on the RT PC introduction: IDC's Morley suggested that the sleeper is neither the RISC technology nor the latest Unix version but the new Virtual Resource Manager (VRM) bundled in with AIX.

On the RT PC, VRM permits PC-DOS applications to run concurrently under AIX. The software module provides a high-level multitasking interface with hardware-independent device drivers. Hardware setups can be changed without patching either the operating system or application software.

VRM will go far beyond the RT PC as it becomes a standard for future mid-scale machines running under multiple operating systems, Morley predicted. "You can look at it as an operating environment," designed to give IBM a great deal of flexibility with various hardware and operating systems products, she said.

"It's a very savvy piece of software," she added. "Every piece of software has to interface with VRM, and IBM controls it."

Micro DBMS mart unsettled

From page 28

into other software. "Systems have to be designed with sufficient flexibility to comprehend a wide variety of environments," Hull commented.

"You want a gateway data base," which would allow users to retrieve data regardless of where it resides, Cubbage said. But such a setup would require an integrated mix of software and communication products that typically is not available off the shelf today, he noted. "The bits and pieces are out there, but you have to know how to put them together."

As elsewhere in micro software, DBMS vendors also are moving to boost graphics capabilities in several ways, one being more advanced generation of charts.

Additionally, graphics increasingly will aid in data design planning and in generating actual code, forecast Rodney Zimmerman, Chevron Corp.'s programmer/analyst who set up last October's Data Base Derby in Chicago.

In the first case, the software will provide aids such as easy creation of flowcharts.

In the second case, now offered in a few micro packages, "instead of having people type in character strings, you can automate the same thing by doing pictures — you may even be able to speed up the process," Zimmerman said.

Another graphics trend is toward image data bases, such as those manipulated by Chorus Data Systems, Inc.'s Photobase on the IBM Personal Computer. Cubbage described these setups as potentially powerful but handicapped until a standard Personal Computer graphics windowing environment arrives.

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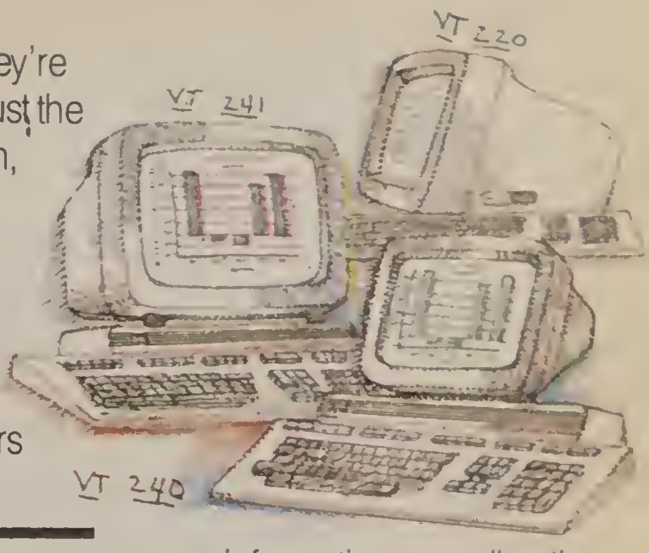

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SOFTWARE & SERVICES

SOFTALK
John Gallant
CW Senior Editor

SQL evolves as a standard

In conjunction with the release of its RT Personal Computer, IBM provided yet another implementation of its Structured Query Language (SQL) via the unveiling of SQL/RT Data Base. Beyond the importance of the product itself — an RT PC-based relational data base management system that provides SQL tools for programmers as well as end users — the announcement was significant as another step in the evolution of SQL as a standard applications program interface.

Currently, the most commonly employed applications interface, which defines how programs interact with data base software, is that for IBM's IMS DBMS. But SQL is rapidly emerging as a second standard and one that will likely eclipse other standards in the coming years. One major factor in the rise of SQL is certainly IBM's backing and its support of SQL in products such as SQL/RT Data Base, DB2 and SQL/DS. SQL is also closely tied to relational data management technology, which will continue to push the product to the forefront.

.The American National Standards Institute (ANSI) is now at work defining a standard for SQL as a programming tool. The intent is to provide some level of commonality among different vendors' implementations of SQL. According to Gartner Group, Inc., no two vendor members of the ANSI committee — a group that features the likes of IBM, Data General Corp., Hewlett-Packard Co., Xerox Corp. and Digital Equipment Corp. — have implemented SQL similarly.

Some important players in the computer industry, including E. F. Codd,

See **SQL** page 36

University forges software

Carnegie-Mellon, IBM unveil high-ed package

By Eddy Goldberg

PITTSBURGH — Carnegie-Mellon University, in conjunction with IBM's announcement of its RT Personal Computer, recently demonstrated Andrew, a prototype software system for higher education. Andrew is a central component of the university's integrated personal computing project, a five-year plan to make advanced function workstations available across the Carnegie-Mellon campus, university officials said.

"Functionally, Andrew is designed to play an important integration role by becoming the development and operating system of choice in higher education. Andrew and Andrew-compatible software will make educational applications as portable as textbooks," said John P. Crecine, senior vice-president for academic affairs.

In addition to Andrew and the advanced-function workstations, the five-year project involves implementation of a single 10,000-node campuswide network designed to link all the university's computers and a vast network-based file system to provide access to centrally maintained data from any computer on campus.

Andrew was developed at the university's Information Technology Center under a $25 million grant from IBM and is in its third year.

The Andrew project employs 35 people, 25 from Carnegie-Mellon and 10 employees on assignment from IBM. Andrew is intended for use by faculty, students and administrators.

Some planned uses of Andrew include computer-aided instruction through the development of educational software programs by professors and support of advanced instruction on computers more powerful than those that have been commonly available on university campuses.

Carnegie-Mellon's initial implementation of the campuswide network consisted

See **UNIVERSITY** page 35

Tarkenton lines up behind Nastec

By John Gallant

SOUTHFIELD, Mich. — Nastec Corp. and Tarkenton Software, Inc. are expected today to unveil a product that links Nastec's microcomputer-based software development tools with Tarkenton Software's mainframe applications generator.

Gammalink will be jointly marketed by Nastec, headquartered in Southfield, and Atlanta-based Tarkenton Software. The package, according to Nastec President James McGuire, allows users to upload the output of Nastec's Designaid system to Tarkenton Software's Gamma applications generator running on IBM and Burroughs Corp. mainframes. The link will automatically reformat Designaid specifications for use with Gamma.

Designaid, on an IBM Personal Computer, supports structured analysis, design

See **TARKENTON** page 36

IBM releases VM file transfer system; adds DL/1 query

By John Gallant

RYE BROOK, N.Y. — IBM recently introduced software that facilitates file transfers between its VM-, MVS- and DOS/VSE-based hosts, and it unveiled a query tool that allows users to access information in DL/1 data bases.

Announced in tandem with its RT Personal Computer, IBM's File Transfer Program Version 2 Release 2 for VM is a native, Systems Network Architecture-based file transfer system for Release 4 of VM/SP. It allows users to transfer or to extend, without the use of a spooling subsystem, CMS files and VSAM data sets between host systems supporting the same version of the software. An IBM spokesman said

See **IBM** page 35

INSIDE

Pansophic Systems unveils a library management and change tracking system to help users monitor the development life cycle/**34**

NEW THIS WEEK

- Hewlett-Packard adds programs to its HP Deskmanager system
- For more on this and other new products, see pp. 67-90.

INSTANT ANALYSIS

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Pansophic introduces info systems monitor

LCS/CMF keeps tabs on program life cycles

By John Gallant

OAK BROOK, Ill. — Pansophic Systems, Inc. has introduced a product designed to monitor and manage changes to information systems.

The Library Control System/Change Management Facility (LCS/CMF) allows users to track programs through such systems development life cycle phases as program checkout, edit, test and implementation. It works in conjunction with IBM's ISPF and, according to a spokesman, is consistent with IBM's Information Systems Management Architecture methodology.

The product also uses the capabilities of Pansophic's Panvalet and Panexec library control tools, the vendor said.

Ensures logging of change requests

According to a spokesman, the system ensures that all change requests are logged, enforces predefined change standards and allows management to coordinate resources. LCS/CMF offers three environments for change management and library control.

The Administration Environment supports the setup and maintenance of the change management environment, definition of procedures for the library and identifying changes and assignment of resources to implement them.

The Program Development Environment reportedly controls the movement and tracking of program members as they flow through development phases.

The Reporting Environment supports reporting on all activities. Reports include standard library management and change management reports.

LCS/CMF pricing ranges from $22,000 to $97,000, depending on the Pansophic products already installed at the customer site, Pansophic Systems said.

Graphics interface out

By Eddy Goldberg

SAN JOSE, Calif. — Visual Engineering, Inc. has announced a graphics device interface that the company claims will end the need to develop device driver programs when new graphics hardware is implemented.

The product, Visual:Graphcap, is touted as incorporating artificial intelligence techniques to provide a single interface for graphics devices, eliminating the need to purchase or develop a new device driver for every new plotter or printer. John Leininger, director of Laboratory Services at market research firm IDC West, called Graphcap "promising, in that it provides a common interface for graphics software and should be very attractive for developers."

According to Mark Rawlins, vice-president of marketing at Visual Engineering, traditional solutions to the use of many different graphics devices in a large company involve dependence on a programming guru, heavy use of CPU resources and a lengthy delay in implementation while a program is being written.

Graphcap consists of two parts. One is the so-called graphics knowledge base, which contains descriptions of specific device functionality. New devices are supported by entering the device name and classifications — such as terminal, plotter and laser printer — into the knowledge base. The second component is Visual Engineering's intelligent virtual device interface, which resides in all of the firm's graphics software.

Rawlins said the interface reconfigures itself to handle graphics requests based on the nature of the target device. It then produces the appropriate character stream or bit patter to control the device.

Graphcap is currently available as part of Visual Engineering's product line, which starts at $700.

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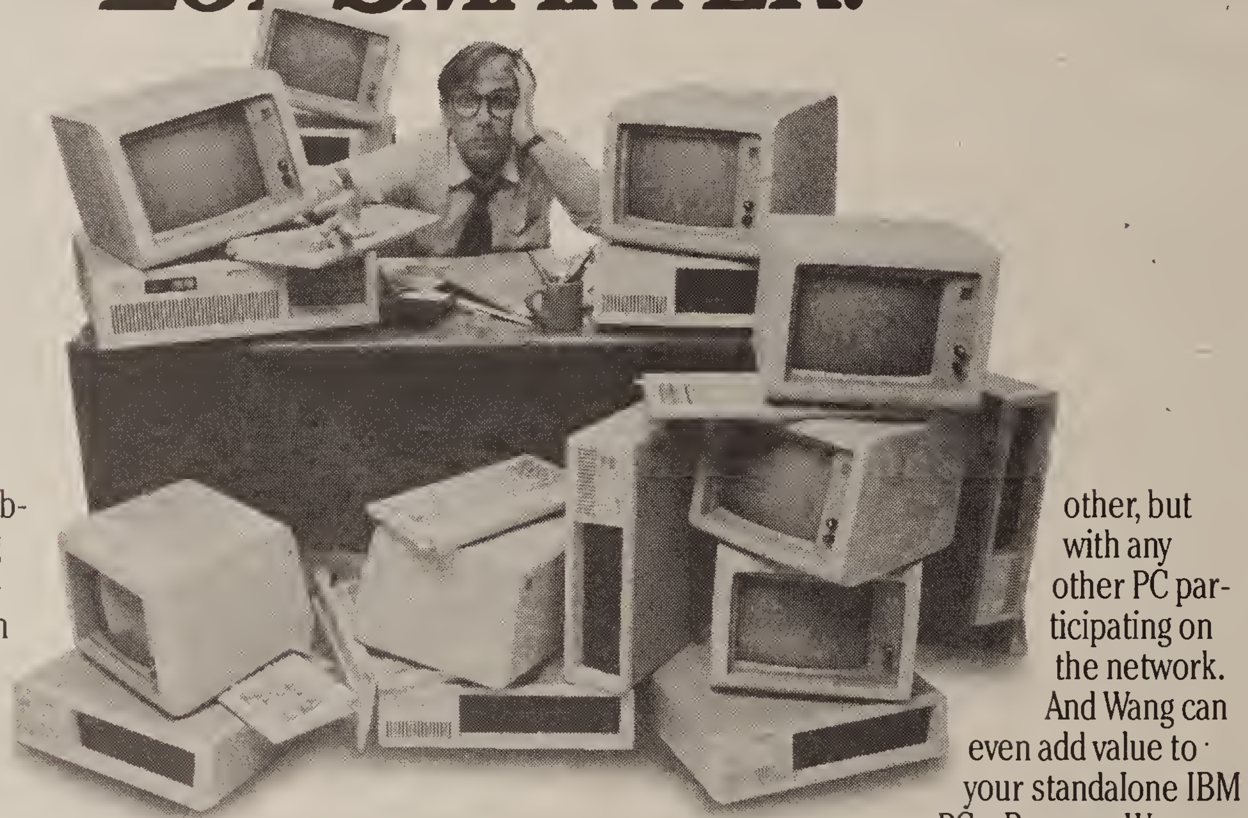
HOW TO MAKE A LOT OF IBM PCs A WHOLE LOT SMARTER.



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IBM releases VM file transfer

From page 33

the package complements the File Transfer Program for MVS and DOS/VSE systems. It features checkpoint/restart and security facilities and data compression capabilities.

The spokesman said any data set organization supported by the MVS and DOS/VSE versions of the package can be stored by the File Transfer Program for VM. Source and target files can be dynamically allocated based on information contained in the File Transfer Program command stream. Also, a programmable interface allows users to access other file organizations that are not directly supported for remote data transmission. The product is scheduled to be available in April for a one-time charge of $450 and a monthly license fee of $11,250.

Query DL/1, available for IMS/VS, CICS/OS/VS and CICS/DOS/VS environments, allows users to query DL/1 data bases directly. The package supports access to DL/1 through a series of menus and prompts, which allows users to select, order and retrieve data. More experienced users can bypass the menus to access data more quickly. Query DL/1 can be used as a debugging tool and for data verification by programmers. The product has a one-time charge of between $12,500 and $20,000.

Several independent software vendors also announced products for the RT Personal Computer:

■ Cadre Technologies, Inc. will sell its Teamwork/SA software development tool for $8,900 per workstation. The software, which aids in systems analysis, will be available in May.

■ Comshare, Inc. made the Personal W microcomputer version of its System W decision support software available for the RT PC. Personal W can be used for modeling, analysis and consolidation reporting. It will cost $950 until June 30.

■ Oracle Corp. provided six packages that work with IBM's newly announced SQL/RT Data Base relational DBMS for the RT PC: Pro*Fortran, a precompiler, priced at $600, that allows programmers to embed SQL statements within Fortran programs; Pro*SQL, a data access tool also priced at $600; SQL*Interactive Application Facility, a $2,000 applications generator; SQL*RPT, a report writer priced at $600; SQL*Calc, a spreadsheet priced at $2,000; and the $600 SQL*Link, which supports information transfer between SQL/RT and the Oracle relational DBMS on mainframes, minicomputers and microcomputers.

Independent software vendors also announced three packages for expert systems development:

■ Teknowledge, Inc. will sell its S.1 expert system development tool. It will be available in March at a cost of $25,000.

■ Inference Corp.'s Automated Reasoning Tool is available now.

■ Intellicorp will offer its Knowledge Engineering Environment for $60,000.

Graphics software from the independents for the RT PC included the following:

■ Issco will offer five graphics software packages that range from a high-level plotting language to a library of predesigned charts. First-year license fees will range from $1,800 to $3,600.

■ Visual Engineering, Inc. said its entire line of graphics software will be sold for the RT PC. Prices for the packages range from $695 to $12,000.

Senior writer Rosemary Hamilton contributed to this report.

University, IBM forge software

From page 33

of a cluster of 23 IBM RT PCs running Andrew. It was demonstrated simultaneously with IBM's unveiling of the new 32-bit reduced instruction set computing-based workstation in late January.

Although Andrew was built on workstations from Sun Microsystems, Inc., its development was closely linked to IBM's work on the RT Personal Computer. Evidence of that tie was the attendance at Carnegie-Mellon's press conference of W. Frank King, group director of advanced engineering systems development in IBM's Engineering Systems Product Business Unit. King is a key IBM person behind the development of the RT Personal Computer, and university officials said he has been involved in the development of Andrew since 1982.

The Andrew system is designed to be portable between Unix-based systems. It has already been successfully ported to workstations from other vendors, including the Vaxstation II from Digital Equipment Corp. The university plans to run Andrew on two to four different manufacturers' computers. University officials said at least three other vendors are developing workstations to run the software.

Andrew is based on a version of the University of California at Berkeley's Unix 4.2. It provides windowing capabilities, a simple user interface and a file transfer system that will support data exchange at high speeds over the entire campus network. Andrew's developers labeled this network file system the software's most distinguished technical feature.

In addition to the advanced function workstations, other campus computer users will be able to participate in the network.

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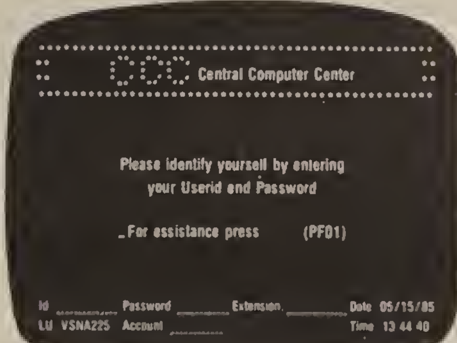

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your Userid and Password

_For assistance press        (PF01)

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LU VSNA225  Account ______                 Time 13 44 40
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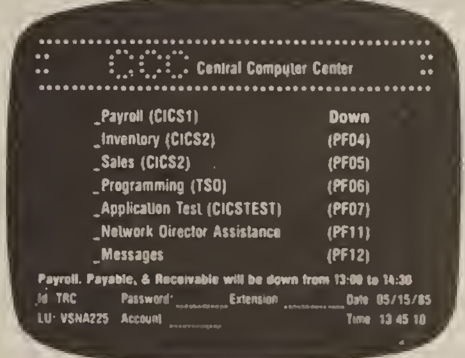

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CCC Central Computer Center

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_Inventory (CICS2)               (PF04)
_Sales (CICS2)                   (PF05)
_Programming (TSO)               (PF06)
_Application Test (CICSTEST)     (PF07)
_Network Director Assistance     (PF11)
_Messages                        (PF12)
Payroll. Payable, & Receivable will be down from 13:00 to 14:30
Id TRC   Password ______ Extension ______ Date 05/15/85
LU VSNA225  Account ______                Time 13 45 10
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SOFTWARE & SERVICES

Tarkenton joins Nastec

From page 33

and documentation. It provides integrated graphics and text for documentation, a design dictionary that acts as a repository for system design elements and facilities that verify the accuracy of design.

Gamma is a Cobol code, screen and report generator that is installed at some 70 sites. It features an application data base that stores system specifications, according to company Chairman Fran Tarkenton.

Changes in specifications can be used to trigger modifications to existing applications, according to the vendor.

"Many existing products for development are nice, stand-alone systems, but they are just piecemeal solutions," Tarkenton said. "We wanted to address the entire development process through Gammalink."

Designaid is priced at $6,900 per workstation.

Gamma is licensed for $186,000.

Gammalink, scheduled to be available this month, will be priced at $10,000 per site license.

SQL evolves as a standard

From page 33

developer of the relational DBMS theory, have criticized ANSI's work to date. Detractors claim the current ANSI guidelines for SQL represent only a lowest common denominator approach to vendor implementations. "Unfortunately, the ANSI standard as now proposed is quite weak," Codd stated in a recent *Computerworld* article [CW, Oct. 21]. "It fails to support numerous features that users really need if they are to reap all the advantages of relational."

Criticism of ANSI's work will probably diminish over time as the standards body continues to extend its SQL guidelines. And, considering the increasing importance of SQL, DP managers should monitor and participate in ANSI's efforts.

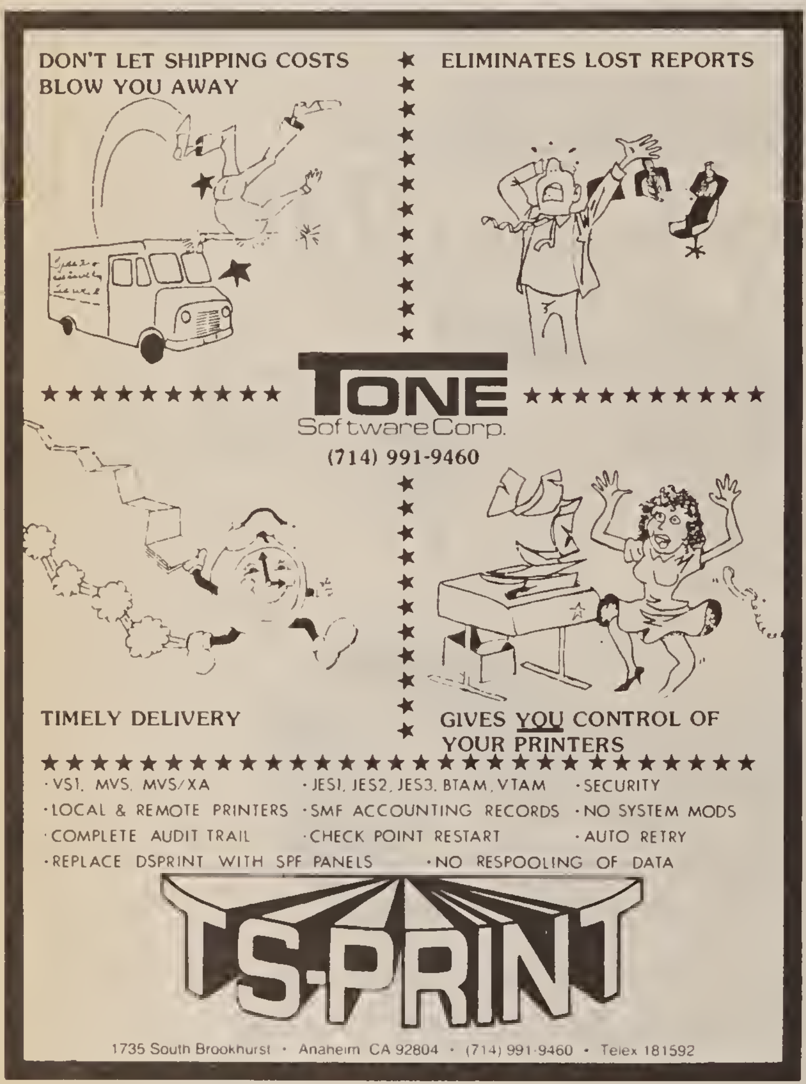
Why is SQL important? According to H. Michael Braude, director of Gartner's Software Management Strategies Service, adoption of SQL standards by vendors will provide at least some level of software portability and will allow users to have more confidence in their software investments.

"The question of whether a product is relational or not is irrelevant," Braude said. "The real question, from the point of view of investment in software technology, is whether the product is compatible with SQL."

Braude said SQL, as a standard for a program interface to data bases, allows users to make software investments in comparative safety. "SQL provides a standard programming environment. It is to DBMS what Ethernet was to local-area networks three or four years ago. It doesn't lock you into any one vendor. It means you can enjoy a little more financial security when making an investment in technology."

Users should be pressing vendors — especially relational DBMS vendors — to explain how their products support SQL and how they plan to extend that support in the future, Braude said. "Users have to evaluate the vendor's commitment to SQL and the extent to which that commitment will allow the user to insulate the application programming asset from transitory technology."

SQL is still in the early stages of its growth. But most vendors and analysts readily agree that it will play a vital role in future software developments. Users have an opportunity to participate in the shaping of SQL today. It is an opportunity that should not be ignored.



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Executive Report

Edited by *Janet Fiderio and Becky Batcha*

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Corporate Unix

A system struggles to earn its stripes

By JOANNE KELLEHER

Until very recently, almost no one associated Unix with corporate data processing. After its creation at AT&T Bell Laboratories in 1969, the operating system traveled almost exclusively in academic and technical circles, where programmers held it in high esteem for its rich supply of development tools, its portability and its multitasking and multiuser features.

But now — almost entirely because of strenuous efforts by AT&T — some people are beginning to perceive Unix as a viable option for large commercial installations. AT&T started its push in 1983, when it announced its System V version of Unix. In the past year or so, the company's efforts have produced significant results.

Probably the most important developments relative to Unix's future in corporate information systems are the inroads that the operating system has made with mainframe vendors.

Jocelyn Young of the market research firm Future Computing, Inc. in Richardson, Texas, points out that Unix "was really a minicomputer operating system that migrated down to microcomputers. Its appearance in the mainframe environment is a fairly new development."

Of the mainframe vendors, only Amdahl Corp. historically offered a Unix version. Amdahl has marketed its UTS for several years, mainly to communications firms and government agencies.

Last year, however, Amdahl entered into a collaboration with AT&T to produce a version of UTS that would be compatible with System V — a version that would seem to be aimed at the large corporate market. In the meantime, Sperry Corp. put together a full micro-to-mainframe line of Unix systems, making itself the first vendor to attempt a total Unix solution.

Before MIS managers invite Unix into their installations on a broad scale, the operating system needs to overcome actual and imagined problems.

Even more telling, IBM joined the Unix bandwagon, albeit halfheartedly, offering VM/IX for its mainframes, PC/IX for its Personal Computer XT and Microsoft Corp.'s Xenix for its Personal Computer AT. IBM did not take these steps because it particularly wanted to or because it had any clear Unix strategy, according to Valerie Rice, a research analyst with International Data Corp. (IDC) in Palo Alto, Calif. "IBM did it because it felt it had to."

Mike Braude, vice-president of software services at the Gartner Group, Inc. in Stamford,

---

Kelleher is a Boston-based free-lance writer who specializes in high-technology issues.

Unix: Earning its stripes

Conn., agrees. Adding Unix capability, he suggests, is a preemptive move on IBM's part to maintain its user base in the event that AT&T 3B2 supermicros start infiltrating IBM shops at the departmental level. Besides, he adds, some level of Unix capacity is necessary to satisfy U.S. government contract requirements.

Whatever IBM's motivation, the company's adoption of Unix casts new light on the operating system. "The main impact," Braude says, "is that it has somewhat legitimized Unix for the corporate market."

Walter Zintz, an associate with Uni-Ops Books in San Francisco, a publisher of literature and training materials on Unix, describes the potential impact in even stronger terms. After getting the nod from IBM, Unix became a strong player in the mainframe market, Zintz says. "It was something on the order of Ford announcing that it would be making Chrysler engines available on all its cars."

However promising this mainframe availability seems, it will not automatically transform Unix into the operating system of choice for corporate DP. Before MIS managers entertain the idea of inviting Unix into their installations on anything like a broad scale, the operating system needs to overcome a number of actual problems and ingrained misapprehensions.

Right now, the few mainframe Unix systems entering business settings are being brought in for special-purpose, turnkey operations, according to Braude. Even Amdahl expects no major shift in mainframe orientation in the near future.

According to Donal O'Shea, Amdahl's UTS products manager, approximately 98% of the current user base for UTS lies in technical or engineering environments. "We've only just begun to see an emergence of interest on the part of the corporate community," he says, "and it is going to take a long time to develop." When it does, he adds, it will probably happen as a result of interest in application software rather than in Unix itself.

Interest in application software, in fact, seems largely to be shaping policy at the departmental level, where Unix machines — particularly supermicrocomputers — are showing their greatest gains. Unix systems now account for only 2% to 3% of departmental installations in commercial settings, but Braude says he believes the share could possibly rise to 20% or 30% by the end of the decade.

HURDLES TO UNIX ACCEPTANCE IN LARGE SYSTEMS ENVIRONMENTS

MITCHELL J. HAYES

Lack of Software
Independent software suppliers have been reluctant to develop Unix software because the market lacks a commanding Unix standard.

Portability and Compatibility
Unix versions supported by different hardware vendors often feature enhancements and additions that undercut portability and compatibility.

Connectivity
Connecting to large systems hosts was not a concern when Unix was designed. Therefore, additional work must be done to make Unix-based machines capable of interconnecting within a distributed processing network.

Ease of Use
Unix is commonly accused of being user unfriendly, cryptic and difficult. Unfortunately, a friendly user interface slows the system down.

Unix vendors must address these four key issues before the operating system can be smoothly integrated into distributed processing shops.

Corporate users currently working with Unix at the departmental level commonly say the factor that drew them to look at Unix configurations in the first place was not the operating system but rather a particular software package.

At Manufacturers Hanover Trust Co. in New York, for example, an end-user application development product introduced the controller's department to Unix. According to Edward Giovine, deputy controller, Inspiration Systems, Inc.'s Prevail software impressed the department so much that the bank decided to test it in-house — even though the software could not run on the corporate host, an IBM 4381. The bank went out and rented some 3B2 equipment and is currently testing the software.

Similarly, a Unix package called Informex from Relational Database Systems, Inc. brought the First National Bank of Chicago into the Unix fold. According to Steven Jackson, vice-president and head of corporate systems engineering, the bank chose Informex as its micro data base standard and started running it on IBM Personal Computers.

But Informex was designed as a multiuser data base, and the single-user machines did not tap its full potential. First Chicago bought a few 3B2s and is testing them now, but the bank has not yet released the Unix machines to users.

Although applications software serves, in a number of cases, as the opening wedge for Unix use within business organizations, the number of packages written for the operating system is actually quite small. Right now, says Dennis Barlow, senior consultant with Arthur D. Little, Inc. (ADL) in Cambridge, Mass., "you probably have one of everything — one decent set of accounting software, purchasing software or computer-aided design and manufacturing software — but not three of anything."

The absence of a commanding Unix standard is a major obstacle to software development, and the situation has fragmented an already small market (see story page 47).

AT&T is striving mightily to rally the industry around the Unix System V. The company has, in fact, made significant progress in that direction through its publication of a System V interface definition and an agreement it hammered out with Microsoft, publisher of the popular Xenix version of Unix. In accordance with the agreement, Microsoft will make all future Xenix releases compatible with AT&T's System V.

Still, says Future Computing's Young, "There are about 30 different flavors of Unix in the marketplace today." Even though many vendors are beginning to line up behind System V, it will probably be a year or a year and a half before real standardization is achieved, Young estimates.

The very glimmer of an emerging standard has produced an increase in development activity over the past year or so. No one expects a ground swell of application development like that which the introduction of the IBM Personal Computer triggered in Microsoft's MS-DOS, but the gathering strength of System V should bring forth some of the software that users have long anticipated and never received.

Phillip Gill, editor in chief of the industry publication *Unix/World*, estimates that vendors now offer approximately 1,000 off-the-shelf programs to run under Unix, compared with 500 two years ago. Beyond that, almost 50% of the software publishers that IDC interviewed in a recent survey reported that they planned to offer packaged Unix applications sometime this year.

Future Computing's Young tempers the optimism somewhat with the reminder that — at least for AT&T's System V — a full 10% of the applications available are operating system utilities. Still, the growth in applications development is a very real phenomenon.

AT&T has decided to broaden the field of application possibilities even further by cooperating with VMark Computer, Inc. of Natick, Mass. VMark is the developer of a fourth-generation language/data base management system called Universe. Universe opens up Unix to

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Expert's Opinion

Marc Rochkind

Programmers and Unix

By MARC J. ROCHKIND

Many love affairs defy logic, but programmers' infatuation with Unix makes a lot of sense — for three good reasons:

- Technically, Unix offers an outstanding development system on which programmers can do their work efficiently.
- Culturally, Unix binds a huge number of programmers together into an international community.
- Psychologically, Unix satisfies many programmers' needs for an intellectually deep and elegant environment.

The technical reasons for Unix's strength as a programming vehicle stem from its origins in the computer science research area of AT&T Bell Laboratories, where a few enormously talented programmers designed the operating system for their own use. They were very picky about what they wanted, and they were severe critics of their own designs.

What's more, in the 17 years since these auspicious beginnings, Unix has acquired what is probably the industry's most complete set of programming tools.

The operating system allows programmers to work in hundreds of languages, including C — its native tongue — as well as Basic, Fortran, Cobol, PL/I, Snobol4, Pascal, Modula-2, Ada, APL, Forth, LISP and Prolog. It offers text editors (including vi and EMACS) for creating programs and control systems (including the Source Code Control System and the Revision Control System) for managing them. And it supports make, a tool that lets programmers build executable programs automatically from source files and object libraries.

Within Unix, programmers find debuggers, standards and portability checkers, cross-reference generators, code beautifiers and printing

Continued on page 52

Rochkind, author of Advanced Unix Programming *(Prentice-Hall, Inc. 1985), conducts technical seminars on Unix and C programming for the Advanced Programming Institute in Louisville, Colo. He worked at AT&T Bell Laboratories for 12 years.*

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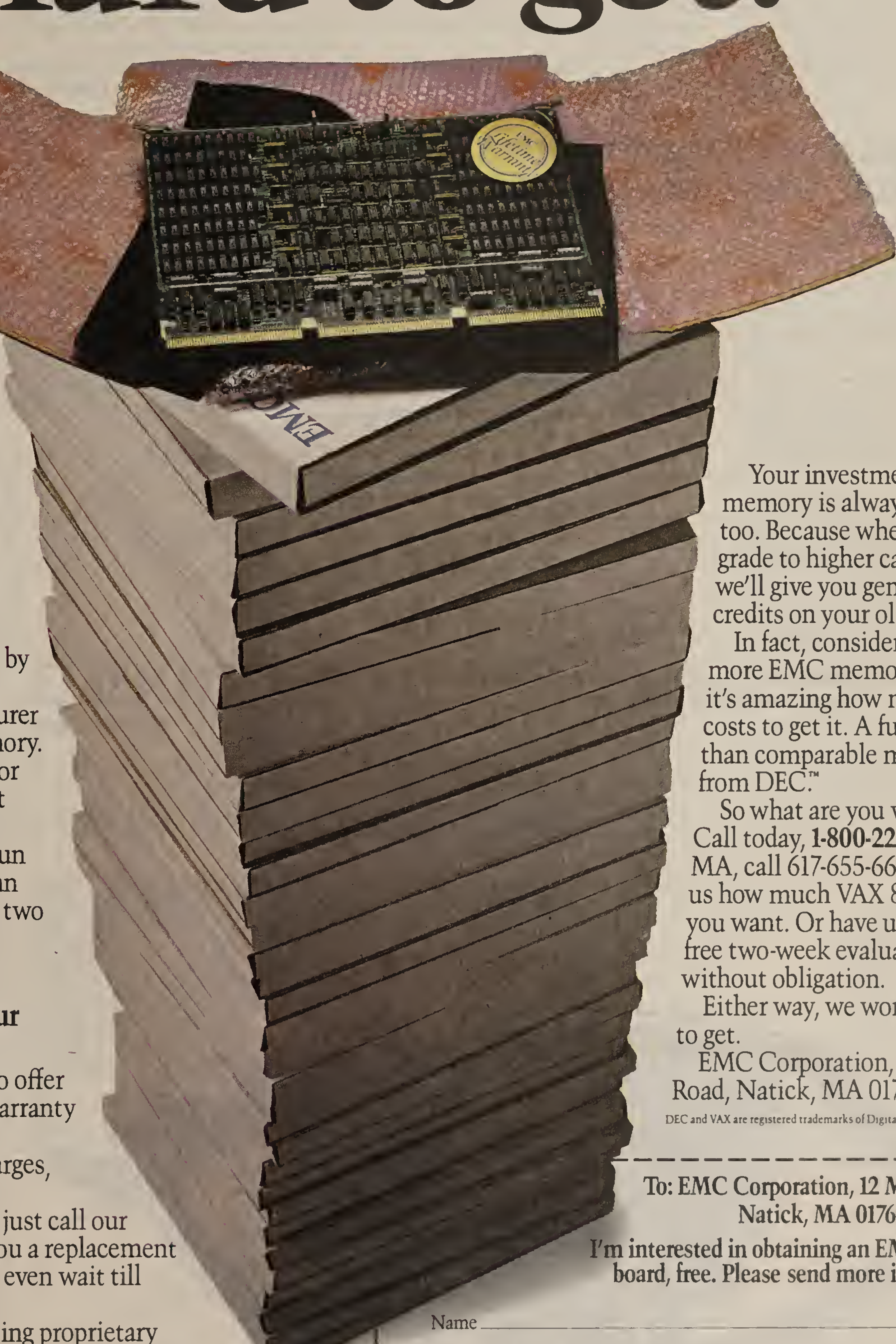

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accommodate applications of the Pick operating system from Pick Systems.

Pick is a multiuser operating system and has an even smaller installed base than Unix. According to Young, however, a larger foundation of software applications exists for Pick than for any single version of Unix. Vendors offer approximately 2,500 applications for Pick, for example, and approximately 300 for AT&T's System V.

Yet another problem arises from the current lack of a true Unix standard, a problem that corporate DP and MIS managers generally consider more crucial than the paucity of application software. A wide gap separates Unix's portability and its compatibility.

Portability — the ability to run on a wide range of equipment — is one of the most attractive and talked-about features of the Unix operating system. But the different Unix versions supported by different hardware vendors feature various enhancements and additions that undercut this portability.

"Right now, software written on a Fortune Systems Corp. system, for example, won't run on another Unix machine," Young says. "Each version uses certain standard Unix commands, but each also has extra features or new commands, and sometimes the same commands will trigger different processes on different machines."

Although users can overcome these incompatibilities, the process requires some educated tinkering. "There are still a lot of machine-dependent parts and kernel segments that have to be adapted," ADL's Barlow notes. Most DP and MIS executives will find this prospect rather unappealing, especially if the lure of vendor independence initially drew them to Unix.

Before long, incompatibility will be resolved, either through the standardization process or through the creation of new facilities, according to IDC research analyst Rice. "Eventually, there will be a way to get easily from one Unix system to another," she says."But a lot of the MIS directors I've spoken with don't even want to deal with that. They want a total solution in one version."

Although many corporate DP and

Continued on page 44

Managers

Most corporate DP and MIS managers are peripherally aware of press reports and vendor activities concerning Unix, but few hear evidence strong enough to convince them that the operating system shows any relevance to their own operations.

In a recent national telephone survey, *Computerworld* asked 30 DP and MIS executives about their acquaintance with and interest in Unix. The sample yielded only two Unix installations. Most respondents clearly indicated their shops held no near-term plans for the operating system.

"Our plate is full enough just trying to deal with what we already have," says Robert Swetavage, MIS manager at Racal-Vadic, Inc., a modem maker in Milpitas, Calif. His cry is a common one and indicates the serious obstacles to acceptance that Unix faces in the corporate DP arena.

The point of least resistance lies in the market for supermicro-based multiuser systems. If Unix makes any headway within MIS and DP shops, it will likely do so here.

George Bailey, MIS director for Whitehall Co., an alcoholic beverage distributor in Norwood, Mass., echoes many of his peers' opinions on the topic of Unix micros. "Nothing, to this point, has shown us that we should be looking at Unix," Bailey says. "But when and if the number of personal computers using Unix gets very large, we might consider it at that level."

Indeed, the two Unix installations the survey uncovered fell into this category:

- Brandt, Laughlin, Schaack, Whipple & Clark, P.C., a law firm in Fredonia, N.Y., uses a Fortune Systems Corp. 32:16XP multiuser

'I keep thinking about Unix because it would be nice to have a vendor-independent operating system.'

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Survey

eye Unix, but few find system attractive enough to buy

micro for accounting, scheduling and word processing.

■ Thomas Publishing Co. in New York recently installed an AT&T 3B2 supermicro in its three-person information service department to track inquiry patterns and automate the production of follow-up letters.

Both installations represent rather specialized situations, however, which raises the question of whether Unix systems can migrate to general-purpose usage or will gain entry to DP shops only for niche applications.

If nothing changes, the latter situation seems likely, according to Al Klein, special projects manager at Thomas Publishing. Unless AT&T pushes the operating system very hard at the microcomputer level, perhaps improving its user interface and providing more comprehensive communications facilities, Unix will remain largely an operating system of academia.

"And that would be a shame," Klein says, "because it is much more powerful than any other operating system I've seen on micros. Certainly it is much more modern than IBM's PC-DOS." Klein also touches on the most commonly cited disqualifier of all. "If only Unix were a little less cryptic," he says wistfully.

The fact that Unix is symbolic and cryptic places a real limitation on its value in a multiuser environment, according to Jeff Borsini, information center manager at Better-Bilt Aluminum Products Co. in Smyrna, Tenn. For multiuser capability, Borsini prefers to run a multitasking emulation under PC-DOS. The IBM operating system — not exactly the ideal in user friendliness — at least moves in the direction of making the user interface easier, he says.

At the minicomputer level, too, one of the leading factors limiting Unix's penetration into corporate DP shops is MIS and DP managers' ability to get many of Unix's advantages without adopting the operating system at all. To begin with, Unix derives much of its power from the C language, which AT&T Bell Laboratories developed to write the operating system. People often link Unix with C, but the two are by no means inseparable.

A great many vendors offer compilers, for example, that allow programs written in C to run under operating systems other than Unix. In addition, many vendors outside the Unix fold write applications packages in C, so users can gain the language's benefits without giving Unix the slightest nod.

Even in one of its areas of greatest strength — program development — Unix falls prey to challengers. By porting Unix's many utilities to other operating systems, vendors can offer users the benefits without the operating system.

Digital Equipment Corp., for example, created its own version of a Unix shell to run under VMS, and implementations for other systems are available in the public domain. According to Kathy Hornbach, manager of software tools selection at Lear Siegler, Inc. in Mendon, Mich., the advent of the DEC shell has actually allowed VMS to outstep Unix as a program development environment.

That does not mean Hornbach would never consider switching to Unix. She considers that frequently, in fact. "I keep thinking about Unix because it would be nice to have a vendor-independent operating system," she says. What has stopped her so far is the realization that true portability is still more promise than reality.

"It may make your programmers more transportable, but it won't necessarily mean that software can be transported easily to different machines," Hornbach says. "Right now, you'd still have to do quite a bit of work to transfer programs from one Unix machine to another."

The true extent of portability remains a sticky issue for many corporate DP and MIS executives. With so many versions and emulations of Unix extant, they say, no one puts much faith in claims of universality.

Another kind of exchange problem — the lack of a facility for transferring information between asynchronous Unix machines and bisynchronous IBM mainframes — further limits corporate DP shops' acceptance of Unix.

The exchange barrier caused Aerospatiale Helicopter Corp. in Grand Prairie, Texas, to decide a few months ago against purchasing a project management system implemented on AT&T's Unix-based 3B2. "We needed to port information between the supermicro and our mainframe," says MIS director Herb Finmark, "and AT&T just couldn't show us a porting capability that worked."

That sort of thing shows exactly why IBM maintains its strong hold on the business market, according to some DP and MIS executives, and why AT&T will probably have a difficult time breaking that hold.

"I have some real reservations about AT&T's ability to put together an integrated-network-type system and make it work in the commercial environment," says Jim Smallman, MIS director of the Harper Group, a freight transport service company in San Francisco. "IBM would make something work, even if there were problems with it, but I'm not sure AT&T would."

Smallman stresses that his reservations toward AT&T are strictly organizational. "They have a lot of talented people," he says, "but their ability to commit those people and deliver them is limited."

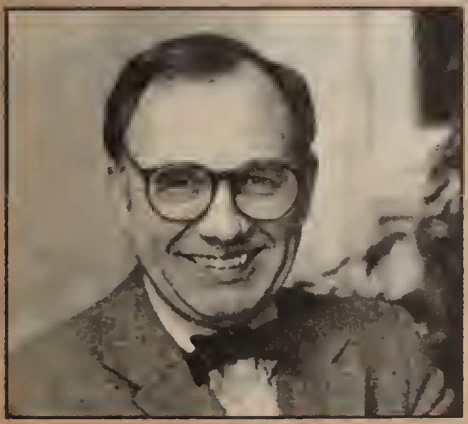
DP and MIS executives may also call upon AT&T to address the major issue of transaction capacity before they accept Unix for their DP operations. For the most part, these executives do not expect real-time processing. But they do expect transaction speeds that are at least comparable to those of other standard operating systems. So far, some say, Unix has not delivered.

"The feedback I'm getting from my technical people is that it just doesn't fit into a transaction-driven business setting," says one DP director, who readily admits to a pro-IBM and anti-Unix bias but prefers to remain unnamed.

Dan Johnson, DP manager at Capitol Bankers Life Insurance Co. in Milwaukee, seconds that opinion. Johnson recently looked at Unix on Prime and AT&T equipment and decided the operating system was just too slow for his company's needs.

Lack of speed is probably a trade-off for transportability and all the other features Unix offers, Johnson says. And in some situations, that trade-off might be acceptable. What bothers him, though, is that "a lot of vendors are claiming that Unix is just as fast as other operating systems, and, from what I've seen, I simply don't believe it." ■

— Joanne Kelleher



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'Nothing, to this point, has shown us that we should be looking at Unix.'

— George Bailey
Whitehall Co.

”

'Our plate is full enough just trying to deal with what we already have.'

— Robert Swetavage
Racal-Vadic, Inc.

”

'A lot of vendors are claiming that Unix is just as fast as other operating systems, and, from what I've seen, I simply don't believe it.'

— Dan Johnson
Capitol Bankers Life Insurance Co.

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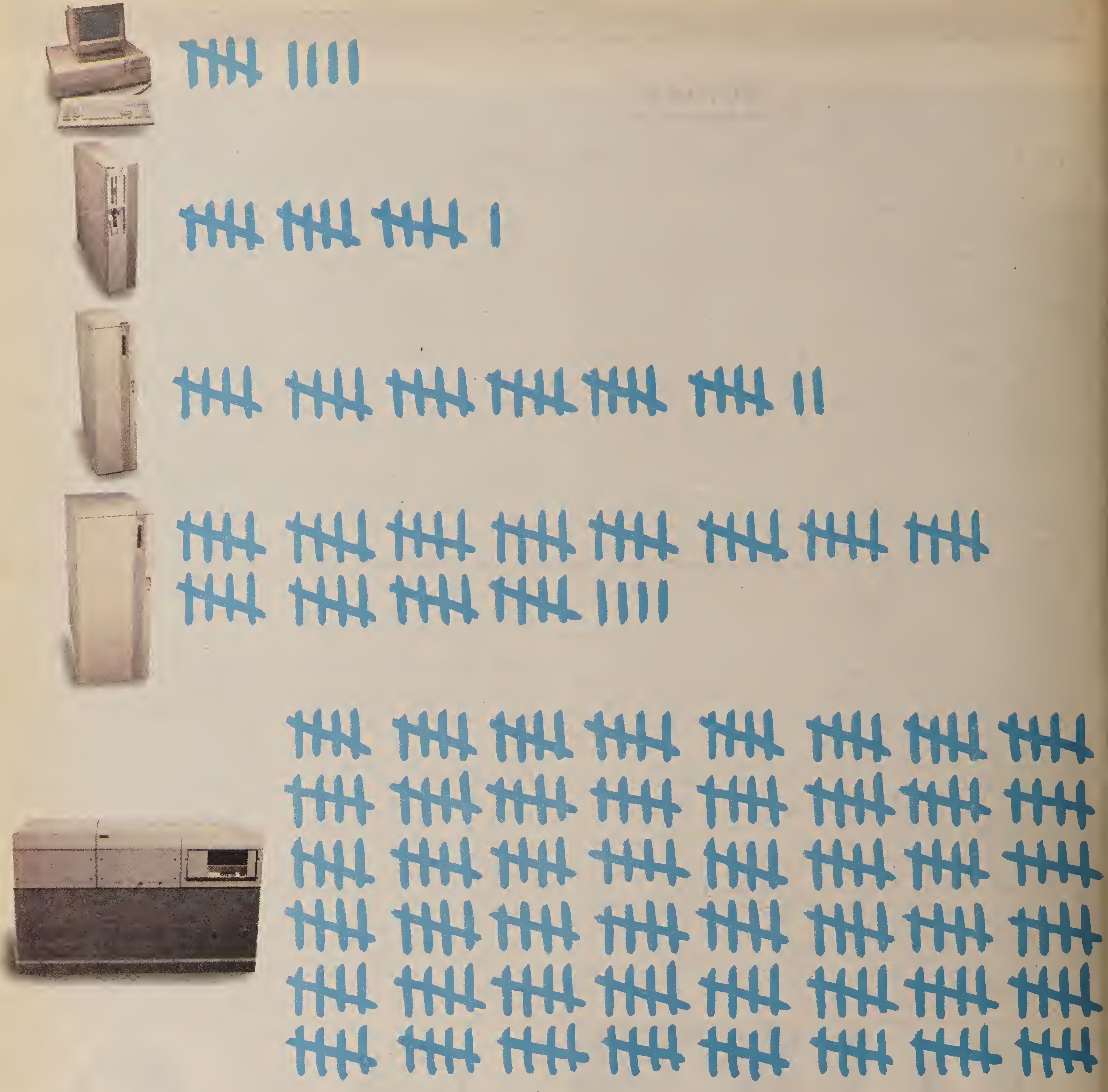
'Unix is much more powerful than any other operating system I've seen on micros. If only it were a little less cryptic.'

— Al Klein
Thomas Publishing Co.



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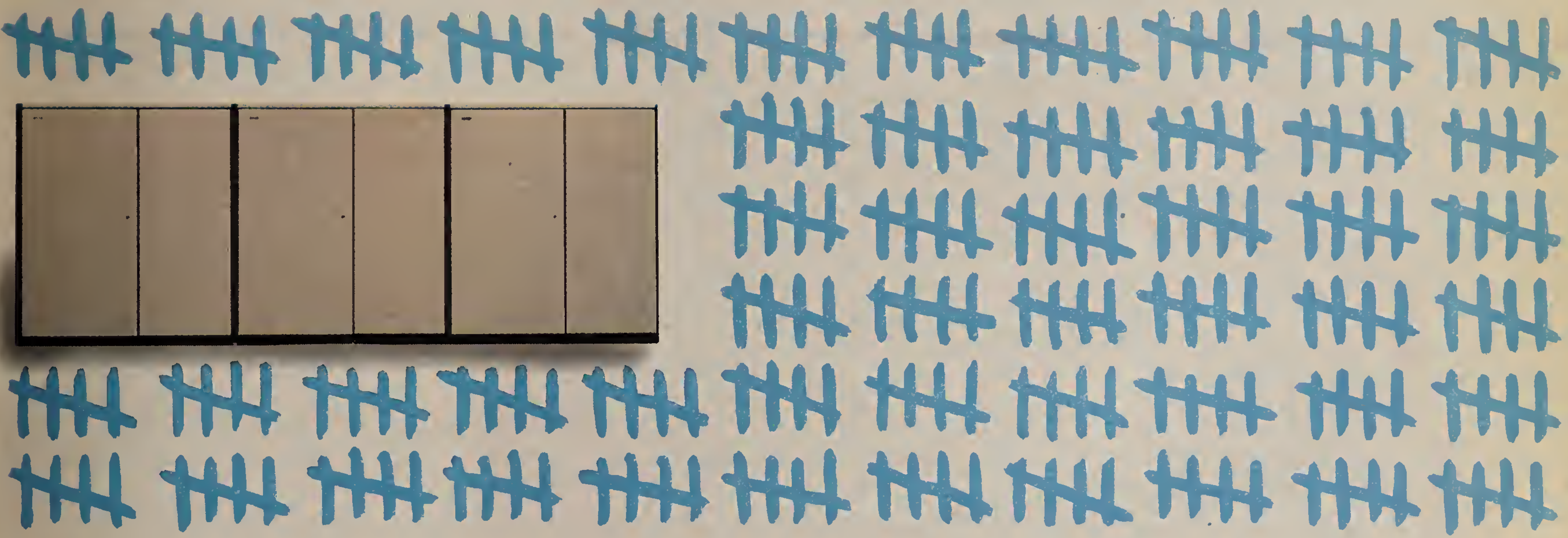

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SPERRY

Continued from page 40

MIS executives would rather wait and see what develops to resolve system incompatibilities in the Unix sphere, a few have found the operating system sufficiently attractive to forge ahead.

Three years ago, West Point-Pepperell, Inc., a major textile manufacturing company in West Point, Ga., decided to create a computerized purchasing and supply system that would coordinate information from sites across the country. The firm did not want to use its existing NCR Corp. 8400 mainframe with a network of terminals, says DP manager Herman Stillwell, partly because of the long-distance line expenses the setup would entail.

As an alternative, Stillwell began looking into using Unix-based supermicros. "This was in 1982, and not many people were thinking about Unix back then," he says.

Calls to a number of developers and software houses, many of which reported rising interest in the operating system, sufficiently reassured Stillwell about proceeding. And proceed he did, making sure, however, that he found a system for program development that offered the closest thing he could find to "pure" Unix.

This, as it turned out, was an Altos Computer Systems, Inc. Altos 68000, which ran AT&T's Unix System III. West Point-Pepperell developed its purchasing and supply system on the Altos machine then ported it to a network of Plexus Computers, Inc. supermicros that it installed later. The network, which runs a combination of Unix System III and System V, consists of a central Plexus P60 and smaller Plexus supermicros at a number of remote plant sites. Stillwell says running the two operating systems concurrently poses no problem.

The remote sites now communicate with the P60 in West Point via modems and WATS tie lines, using Unix's communications command facilities. West Point-Pepperell is pleased with the Unix machines' performance.

The firm, however, has little more companionship in its active usage than it did during its initial explorations in 1982. The installed base for Unix systems remains very small. IDC puts the figure at 231,285, with

Continued on page 46

AT&T stocking its Unix library of applications

By ANNE R. LOVETT

Unix may be easier than most operating systems to port to a new vendor's hardware, but this capability is rarely the sole justification for adopting the operating system. Availability of appropriate software is a more important consideration than the number of machines Unix can run on.

To overcome the current lack of Unix applications, AT&T designed a two-pronged approach to the problem: internal software development and cooperation with external software developers.

Internally, AT&T offers customized software services to key accounts through its Customer Programming Services Centers. The nationwide centers, increasing in number from six last year to 11 this year, provide customized programming, technical consulting, project management and training.

AT&T retains ownership and all rights to software developed by these services centers. The client company receives a one-time, nontransferable license. Thus, all custom software becomes part of the Unix library of applications.

To encourage independent software vendors and value-added resellers to write Unix software, AT&T offers various incentives, such as discounts on AT&T Unix-based hardware and marketing assistance once a software application is completed.

AT&T's marketing assistance can include the following:

- Listing independently developed software that meets company standards in its software catalogs.
- Distributing independently developed software through AT&T's established sales channels.
- Purchasing licensing agreements from independent software houses and placing AT&T account executives on sales incentive plans. (This plan also provides full support for the product.)

According to Greg Avis, vice-president of Summit Ventures, a venture capital firm based in Boston, the outlook for more high-quality Unix applications is good.

Avis said he believes the increased standardization of Unix is encouraging more and more entrepreneurs to fill the void of Unix software.

"We're now seeing many more attractive young companies providing good Unix applications software, especially targeted at vertical markets," he says. ■

Lovett is principal of Avenir Associates, a software consulting firm based in Boston.

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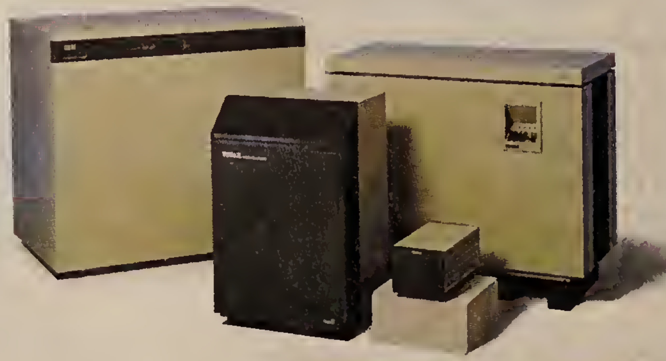

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INFOTRON SYSTEMS

Continued from page 44

112,400 units shipped last year, for a total of slightly more than $3 million. The research firm projects an increase to an installed base of 408,800 in 1987, with shipments for that year slightly less than double the current volume.

A growing interest in microcomputer networking will probably help to push Unix in the corporate market, according to Rice. "Connectivity between personal computers is really going to take off in 1986," she says.

Whether Unix can catch that tide remains questionable, according to the Gartner Group's Braude, who says that the real networking issue for large shops is that of connecting departmental computing networks to the corporate mainframe.

A great deal depends, he says, on how quickly Unix vendors develop the systems software necessary to allow connections between corporate IBM mainframes and departmental Unix systems.

”

Communications ranks as one of Unix's strong points. Built into the operating system is a set of sophisticated telecommunications tools that provide a broad range of capabilities.

Communications ranks as one of Unix's strong points. Built into the operating system is a set of sophisticated telecommunications tools, referred to as a group as the Unix-to-Unix Call Program (UUCP). The UUCP provides a broad range of capabilities, from electronic mail to the execution of programs on remote equipment.

As Braude points out, however, Unix was not designed with connections to an IBM host mainframe in mind, and some additional work will be needed to make Unix-based machines capable of interconnecting and cooperating within distributed processing networks.

Work toward a resolution of the problem is proceeding on two fronts. On one side, vendors such as Orion Group, Inc., Pathway Design, Inc. and the Santa Cruz Operation are developing and beginning to market software communications connections that link Unix systems with IBM's Systems Network Architecture.

At the same time, both AT&T and Sun Microsystems, Inc. are laboring toward the creation of heterogeneous distributed file systems that provide transparent file access across a broad range of equipment. Work on both fronts remains far from complete, however.

Another obstacle to Unix's commercial acceptance — its perceived lack of transaction speed and functionality — may be harder yet to overcome. Inherently, Unix may be no less capable than other standard operating systems; both experts and shoppers are divided on the point. But previously implemented network architectures have not shown Unix to good advantage as a contender in high-volume, transaction-oriented business settings.

"As far as I can see," says ADL's Barlow, "Unix still lacks good transaction processing, which is what is needed for the data processing end of a business."

Unix presents another deficiency in its public face. By almost every account, it is a cryptic and difficult operating system. In its research report "The Market for Unix System Training," published last June, the New York market research firm Frost & Sullivan, Inc. notes the following:

"Although highly touted, [Unix] is a disaster for the casual user. Even for a well-seasoned heavy user, difficulties arise such as copying old files over new, transferring files into themselves until the system collapses and removing all the files from the directory, simply because an extra space was typed in the argument string."

If Unix is ever to become a

Continued on page 50

AT&T joint ventures clearing path for System V as standard

By **ANNE R. LOVETT**

When it concerns Unix, AT&T's message to users and vendors is clear: The System V interface definition sets the Unix standard. All interested parties should adhere to this basic standard, adding enhancements on top of the standard.

The company's efforts to solve system-level problems and promote System V as a standard were evident last year when it signed joint agreements with several companies offering Unix-derived operating systems. In particular, its announcements of cooperative efforts with Sun Microsystems, Inc. and Microsoft Corp. represent coups for the company. Details about both arrangements have been kept quiet, but the significance for the standardization of Unix System V is clear.

Notably, AT&T and Sun Microsystems, the caretaker of the University of California at Berkeley 4.2 Unix version, agreed to combine a reasonable superset of System V and Sun's operating system into a single, improved version of System V. The resulting enhanced System V, which will run existing System V applications, will provide the Berkeley 4.2 networking capabilities that were missing from System V.

In addition, AT&T persuaded Microsoft, the developer of Xenix, the mostly widely installed Unix-based microcomputer operating system, to make future releases of Xenix compatible with Unix System V. Since Xenix is based on AT&T's Unix System III, this agreement is essential for Unix System V to proliferate instead of System III on microcomputers.

AT&T signed several other important joint venture agreements in 1985.

■ Its agreement with Amdahl Corp. produced a System V-based operating system designed to run on IBM and compatible mainframes. Therefore Amdahl's Universal Timesharing System/V is now called V-VM.

■ VMark Computer, Inc.'s recent OEM arrangement with AT&T gives Unix users access to Universe, VMark's on-line fourth-generation language and data base management system developed for Pick Systems' Pick operating system. Universe makes the estimated 2,500 Pick-based software applications compatible with AT&T Unix-based systems.

■ Lastly, AT&T's contractual agreements with Intel Corp., Motorola, Inc. and National Semiconductor Corp. to port Unix to their respective microprocessors may bring binary compatibility to Unix microcomputer systems.

These cooperative arrangements indicate that AT&T is willing to incorporate non-AT&T enhancements into System V. This assures both the user and the vendor communities that AT&T, in its efforts to propel Unix into standards stardom, will not ignore the accomplishments of other developers.

As far as AT&T's plans for 1986 go, several developments will probably occur. Recognizing the importance of the federal market, AT&T will likely make some significant product announcements aimed at the government and military markets at the end of this year's first quarter. In addition, AT&T will continue solidifying its 3B line and signing on independent software vendors and value-added resellers to supply software.

For Unix hybrids and look-alikes, it now appears that while these systems will continue to exist, they will not likely experience explosive growth. Although many issues must be settled before the Unix user community settles on a standard, it appears at long last to be working together — somewhat. ■

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Continued from page 46

generally used operating system, the report concludes, "it has got to be fixed."

West Point-Pepperell's Stillwell agrees Unix can be difficult to work with.

"There are some inherent problems," he says. "There are times when it can corrupt itself quite easily."

On the positive side, though, Stillwell also notes that Unix operating systems — particularly those with University of California at Berkeley enhancements — provide tools to correct "just about anything you may have done wrong."

Unix unfriendliness poses no problem to his firm's users, he says, because they remain totally insulated from the operating system itself and deal only with menu-driven shell programs.

In fact, most users never encounter the operating system because commercial applications software packages often layer a friendly interface between Unix and the system's users.

Unfortunately, according to IDC's Rice, "wrapping Unix in a nice shell tends to slow it down."

Looking toward the future, the Gartner Group's Braude estimates that all the Unix pieces will fall into place by 1987.

Last year, vendors addressed a major user concern by announcing security and file-locking protocols for Unix.

These protocols were sorely needed because until the protocols arrived, Unix — a system designed for group interaction — had offered no real data protection facilities.

It is questionable, however, whether the market will wait long enough for all of the other issues to be resolved.

At the moment, a window of opportunity lies open for Unix within the area of departmental computing, according to Braude.

Local-area networks offer no real cooperative processing with the mainframe, he says, and IBM has provided no coherent strategy.

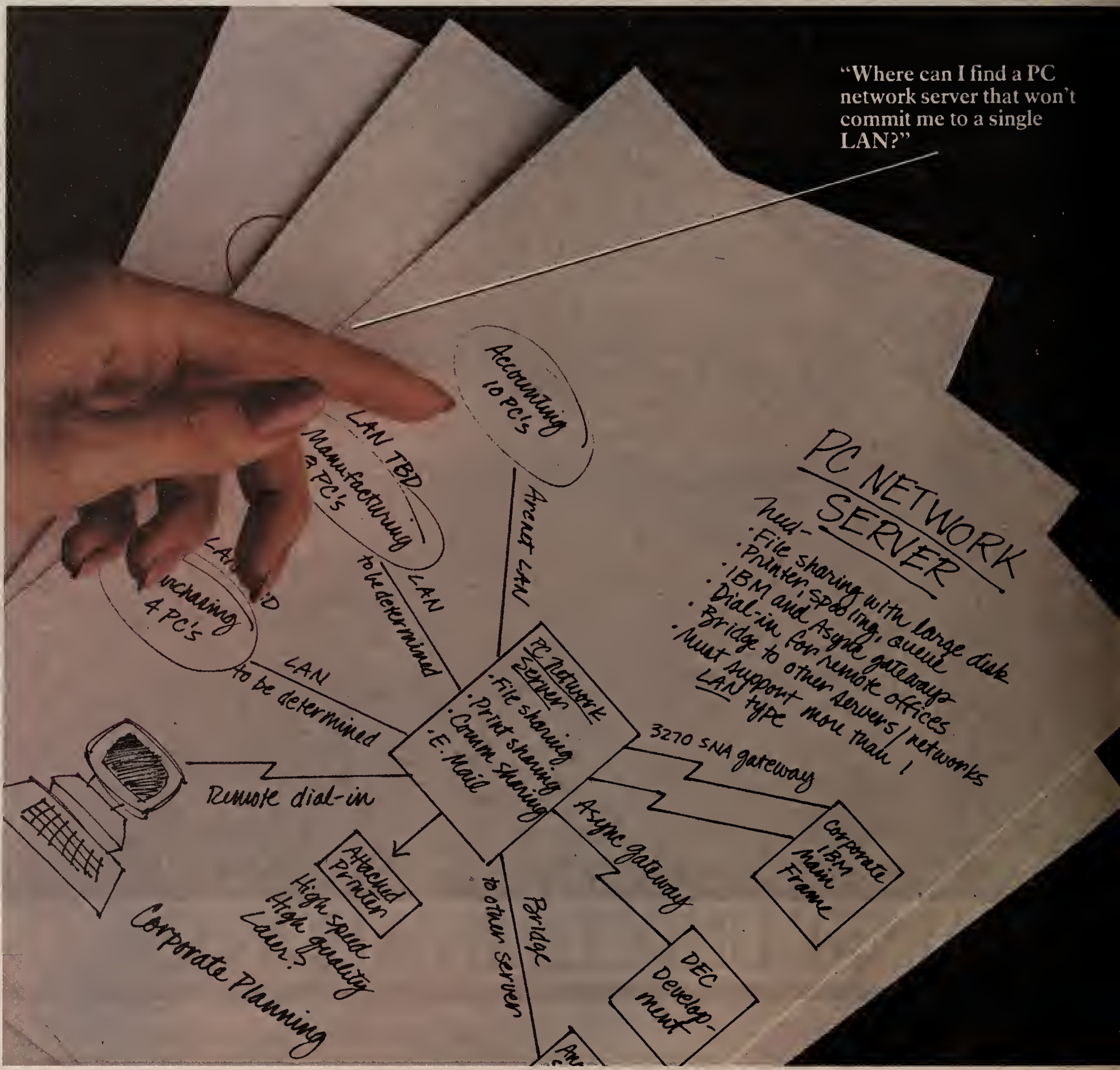
"In a couple of years, though, there is no telling how much the market for this operating system will have changed and how much of the current opportunity will have eroded," Braude says. ■

UNIX IMPLEMENTATIONS

Vendor	System
Amdahl Corp.	*UTS*
Altos Computer Systems, Inc.	*Microsoft Corp. Xenix, AT&T System V*
Apollo Computer, Inc.	*Domain/IX, System V, University of California at Berkeley 4.2*
AT&T	*System V*
Cadlinc, Inc.	*Berkeley 5.7*
Charles River Data Systems, Inc.	*Unos*
CIE Systems, Inc.	*Alcyon Corp. Regulus*
Computer Consoles, Inc.	*Perpos*
Convergent Technologies, Inc.	*Ctix*
Convex Corp.	*Convex Unix*
Cray Research, Inc.	*System V*
Data General Corp.	*DG/UX, MG/UX*
Datamedia Corp.	*System V*
Digital Equipment Corp.	*Ultrix*
Elxsi	*Enix 3.1*
Fortune Systems Corp.	*For:Pro*
Gould, Inc.	*UTX/32*
Hewlett-Packard Co.	*HP-UX*
IBM	*Xenix, PC/IX, IX/370*
Intel Corp.	*Intel 286, Xenix*
Masscomp	*RTU*
Motorola/Four-Phase Systems, Inc.	*System V/68*
NCR Corp.	*System V*
Perkin-Elmer Corp.	*Xelos*
Plexus Computers, Inc.	*System V*
Prime Computer, Inc.	*Primix*
Pyramid Technology Corp.	*OSX*
Ridge Computers, Inc.	*ROS*
Sun Microsystems, Inc.	*Berkeley 4.2, System V*
Texas Instruments, Inc.	*Xenix, System V*
Zilog, Inc.	*Zeus*

Source: International Data Corp.

There are more than 30 vendors that offer variations of the Unix operating system. The lack of a Unix standard has confused the user community and has concerned software developers; both groups have slowed the wide-scale acceptance of Unix. A trend toward standardization is taking place, rallying around AT&T's Unix System V. If, however, vendors cannot agree on a standard, users will continue to cast a skeptical eye on the operating system.



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Unix advancing in drive toward European market acceptance

By AMIEL KORNEL

Several key developments in the past year have strengthened the Unix operating system's European standing. Industry analysts and officials say forces are gathering that might finally win Unix some commercial success in Europe.

Probably the most important development was the February 1985 creation of the Open Group for Unix Systems by major European computer manufacturers.

The stated objective of the group, which is better known as X/Open, is to promote the development of applications based on the AT&T Unix System V.

The participants — France's Groupe Bull, West Germany's Nixdorf AG and Siemens AG, Italy's Ing. C. Olivetti & Co., Britain's ICL Plc., the Netherlands' N.V. Philips and L. M. Ericsson of Sweden — say they feel that by defining a set of standard specifications they can allay user fears and stimulate the development of applications. And, with one standard, the Europeanwide market would be opened to each of them.

The choice of Unix as a standard was a pragmatic one, X/Open members say. "It is a system that has some elegant functions," says Georges Lepicard, a director in corporate marketing and strategy at Groupe Bull, the French computer maker, "but it also has some weaknesses." Lepicard says that the main reason for choosing Unix was that the system already existed and was beginning to make headway in the U.S.

X/Open presented its first list of Unix specifications in October, all based on the Unix System V. The group insists that it does not want to create a separate European standard but merely to work out the details of the system's implementation.

"We do not plan to have a European flavor in our Unix," Lepicard affirms. "We are not seeking today to diverge from AT&T."

In addition to the major hardware makers, European software houses are beginning to unite to promote the development of a wider market and to assure the availability of technical assistance for Unix users.

In October, two West German firms — Mathematischer Beratungs und Programmierungsdienst GmbH and Periphe Computer Systeme GmbH — signed an agreement to cooperate in the distribution of a Unix-based Cobol compiler.

At the end of October, four European Unix-oriented software houses announced the creation of the Unno Association for the promotion of Unix. Inspired by the X/Open group, Unno members say they plan to coordinate their marketing efforts and provide pan-European software maintenance.

In September 1984, AT&T reinforced its backing of Unix in Europe with the creation of a joint venture with Olivetti called Unix Europe.

AT&T also revealed in late November of last year its plans to boost its marketing efforts in Europe and strengthen its presence with the creation of a new and bigger European headquarters.

Unix Europe, based in London, distributes Unix source code to encourage software houses and hardware makers to develop programs for the system. Olivetti, which owns 50% of the company, makes available porting tools that allow users to transport existing software packages to AT&T's 3B minicomputer line.

"I think we'll find that 1986 will be a period of steady growth" for Unix, predicts Peter Griffith, managing director of The Instruction Set, a British software house.

There is certainly room for growth. As in the U.S., Unix has had little success in the European market for commercial applications.

"The market for Unix is essentially scientific for the moment," says Stephane Zadri, president of French software house Axis Digital. For commercial applications, he acknowledges, the market is still miniscule.

Nevertheless, the stakes are high. According to figures supplied by International Data Corp. (IDC), a market research firm based in Framingham, Mass., multiuser operating systems, valued at $1.2 billion, accounted for approximately 40% of the total European market for operating systems software in 1985. The market is expected to grow at an average annual rate of 26% up to 1990. IDC analysts estimate that Unix currently accounts for only 3% of this market in Europe.

But even if Unix makes headway, it is not expected to leave a bloody battlefield littered with the remains of other systems.

"Unix's progress is assured," Lepicard says, "but it is also certain that Unix will not sweep away other systems." ■

Kornel is Paris bureau chief for the Computerworld News Service.

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Continued from page 38

utilities. They have access to an elaborate technical word processor that helps them document their work. They get to use a file system that helps organize everything and an electronic mail setup that helps programming teams communicate.

There's lots more, too, and more comes along every year. Best of all, Unix tools are well documented (for programmers, at least), reliable and mostly free.

The cultural reason for programmers' attraction to Unix is simple: When one uses Unix, one joins the in crowd, the elite, the intelligentsia.

This held true in the early days, when the best known and most respected computer scientists at Bell Labs all used Unix, and it remains true today, mainly because Unix became entrenched in computer science departments at schools such as MIT, the University of California at Berkeley and Carnegie-Mellon University. Also, most software products coming out of universities and research labs come out first for Unix.

Moreover, a huge, loosely knit community known as Usenet unites thousands of Unix programmers around the world via electronic mail.

Usenet resembles a gathering around the stove in the general store on Saturday afternoon, but it is much bigger and much more diverse, and it goes on 24 hours a day. Discussion groups form around technical topics like programming languages and artificial intelligence as well as around general subjects like feminism, guns and Lake Wobegon.

Finally, psychological reasons loom. Programmers are an exceptionally curious lot. They enjoy peeling back layers of complexity to see what lies underneath. Instead of playing with their toys as children, they took the toys apart to see how they worked. Back then, today's programmers loved Tinkertoys and Erector Sets. Now they love Unix.

Unix is intricate, sophisticated, unplumbed, unfathomable. Programmers who have used it for years are still discovering new tricks, new features and new possibilities.

It supports hundreds of commands, thousands of options, millions of combinations of things and trillions of combinations of combinations. Everything plugs into everything else, and it all changes practically every day.

A novice can get started in an hour, but an expert cannot learn everything in 10 lifetimes. Unix is the ultimate game of Adventure, and programmers get paid for playing. ■

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> ***Unix is intricate, sophisticated, unplumbed, unfathomable. Programmers who have used it for years are still discovering new tricks.***

For further information on Unix

Readers who are interested in learning more about business applications for the Unix operating system may find the following publications and events helpful.

Publications

Introducing the Unix System. Henry McGilton and Rachel Morgan. McGraw-Hill, Inc., New York, N.Y. 1983.

Introduction to Unix System V. Robert A. Byers. Ashton-Tate Publishing Group, Culver City, Calif. 1985.

Understanding Unix: A Conceptual Guide. James R. Groff and Paul N. Weinberg. Que Corp., Indianapolis, Ind. 1983.

Unix Primer. Ann N. Lomuto and Nicholas Lomuto. Prentice-Hall, Inc., Englewood Cliffs, N.J. 1983.

Unix Products Directory, Winter 1986. Usr/group. Santa Clara, Calif.

The Unix Programming Environment. Brian Kernighan and Robert Pike. Prentice-Hall, Inc., Englewood Cliffs, N.J. 1984.

Unix for Super-Users. Eric Foxley. Addison-Wesley Publishing Co., Reading, Mass. 1985.

The Unix System. Stephen R. Bourne. Addison-Wesley Publishing Co., Reading, Mass. 1982.

The Unix System Encyclopedia, Second Edition. Yates Ventures, Inc., Los Altos, Calif. 1985.

Events

FEBRUARY 4-7, ANAHEIM, CALIF. — **Third Annual Uniforum.** Contact: Usr/group, Suite 200, 4655 Old Ironsides Drive, Santa Clara, Calif. 95054.

FEBRUARY 15-17, DENVER — **Usenix.** Contact: Usenix Conference Office, P.O. Box 385, 16951 Pacific Coast Highway, Sunset Beach, Calif. 90742. Also being held June 10-13 in Atlanta.

OCTOBER 20-22, NEW YORK — **Unix Expo.** Contact: Don Berey, National Expositions, Suite 12A, 49 W. 38th St., New York, N.Y. 10018.

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In Depth

Friendly mainframe software guides users toward productivity

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To a user, the user interface is the system — the rest is a black box. If the interface doesn't work, it doesn't matter what clever algorithms lie inside the box. The responsibility for creating usable software falls squarely on the shoulders of the designer.

By Bob Stahl

The MIS director of a Fortune 500 company was remarkably candid in a recent meeting when he explained his company's sudden interest in user-friendly software design. "In the past five years, we've produced more than one multimillion-dollar system that failed when we put it in the field because it was too difficult to use. That can't happen again."

One problem is that most applications development methodologies in use today are left over from an earlier time, and they reflect the concerns that the MIS department focused on almost exclusively then: reducing the costs of coding, testing and maintenance.

But the definition of a good system changed. A successful system today must be easy to learn, easy to use and efficient for the target group of users. The key is to start with an interface based on sound principles, then fine-tune it through prototyping.

The benefits of building truly usable systems are numerous. A system that is easy for end users to understand not only achieves better user acceptance, but it also does the following:

- Requires less support.
- Requires less documentation.
- Requires less training.
- Produces lower error rates.

The importance of getting the interface right cannot be overstated. To an end user, the interface *is* the system; the rest is a black box. If the interface doesn't work, it doesn't matter what clever algorithms are inside the box.

This new emphasis for applications developers results from the sweeping change that occurred in the last decade. Most systems are now interactive and must serve many end users, who have become an integral part of the system. A working system now consists of the hardware, the software and the end user.

But at many companies, the design techniques remain largely unchanged from the days when all systems were batch systems that ran payroll at night or updated a data base. These design techniques are still valid, but they need to be supplemented to remain effective.

Prototyping is now coming into vogue as one solution, setting up a feedback loop with the end user early in the development cycle. What prototyping does best is to uncover small design oversights, such as leaving the invoice number off an accounts payable screen. That works because the end user knows his job better than the programmer does.

However, prototyping is not effective in designing a good user interface because the end user cannot be expected to be an expert in system design or to suggest design alternatives. That responsibility falls squarely on the shoulders of the designers.

Target the end user

Designing systems that are easy to use requires three steps:

- Understanding how people think, see and use tools to do work — a body of knowledge resulting from "human factors research."
- Developing a collection of software techniques that take advantage of these principles.
- Selecting the right techniques for the target group of end users.

Implementation means incorporating this process into a coherent and practical methodology that can be taught and that can be integrated with an installation's existing design methodology.

We will deal with each of these topics in turn.

Human factors

Research into human factors yields certain results that are relevant and important for software design:

Short-term memory limitations. Research has shown that people can remember approximately seven things, plus or minus two. This short-term memory decays in about 15 seconds.

A common design mistake that makes software hard to use is overloading short-term memory. If we display 12 options on a menu, short-term memory will be overloaded and the end user will have to read the selections each time instead of remembering them. The best approach is to stay

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Stahl is president of The Interface Design Group in Oakland, Calif., a consulting firm that provides training for development staff.

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> *Those of us in data processing like to focus on the software — it's how we earn our keep. But from the end user's perspective, every time he has to notice the software, it's a step backward.*

well within the limit and display five or six items.

Recognition vs. recall memory. It is much easier to recognize something that we have seen than it is to recall it. Instead of forcing end users to recall file names by using a prompt such as ENTER FILE NAME, display a list of available file names, and let them recognize the one they want and select it with the cursor.

Visual and motor skills. People are very good at detecting visual objects and slight movement. Those who were not were weeded out in the swamps in the early days of mankind. So whenever you can represent something visually, do it.

People are also quite good at developing muscle memory for various actions. An example is a pianist, whose fingers "remember" where to find various notes. To exploit this principle in software design, separate physical locations of different actions, as many dedicated word processors have done. One problem with function keys is that they are clumped together in one block, so that there are only small differences between the muscle memory for adjacent keys, resulting in frequent end-user errors.

Design techniques

To provide a framework for discussing the second step — design techniques — we will use the acronym TROPICS, which stands for transparency, resilience, orientation, productivity, integrity, control. The S, of course, is reserved for future use. Each of the TROPICS categories describes a quality that is important to software usability.

The first quality is transparency. End users have no interest in the software per se. What they want to do is print a report, examine some invoices or enter an order. To the extent that the software helps users do the task, they will use it, but they should not be forced to be aware of the software or what it is doing. Most of the challenge in making software user friendly involves lowering the profile of the software so that the user can see his work instead of the software.

This is often a problem area, because those of us in data processing like to focus on the software — it's how we earn our keep. But from the end user's perspective, every time he has to notice the software, it's a step backward.

While transparency makes a good general goal, in practice we frequently have to settle for the next best thing: intuitiveness. Software is intuitive if it does what the end user would naturally or naively guess it would do. Intuitive software feels good to the user, who can just slide into the driver's seat, make a few intelligent guesses and be off.

Of course, this requires added effort on the part of the designer, but no one should start trying to design intuitive software without first examining who the end users will be.

Writing intuitive software minimizes the amount of new information that end users need to learn in order to use the software; it takes advantage of what users already

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know. There are generally four sources of end users' prior knowledge:

Previous experience of life in a particular culture. For example, in the U.S., most adults know how to drive a car. They know that if you turn the wheel to the right, the car goes right; turn it to the left, and the car goes left.

That is not how an airplane or a sailboat with a tiller works, but it is how people expect cars to work. These may be only arbitrary conventions, but imagine what would happen to a manufacturer that produced a car with the positions of the gas and brake pedals reversed. Work with the expectations, not against them.

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> ***The rule of consistency calls for no context-dependent actions. If a key does something in one environment, it does that in all environments in a consistent system.***

Analogy with the manual method. Some systems imitate the manual method of doing the same job. Software may simulate an office with a telephone, a filing cabinet, a memo pad and so on. The advantage is that many people feel more at home dealing with a filing cabinet that contains drawers, folders and pieces of paper than they do with a data base of subdirectories, files and records.

The danger in using an analogy with the manual method is that at some point the analogy breaks down, and we cannot expect the end user to know where that happens. Paul Heckel, author of *The Elements of Friendly Software Design* (Warner Books, New York, 1984), tells a story of a secretary who lost an important file on a word processor. When the problem was explained to her, she protested, "But in my filing cabinet, I can have two folders with the same label on them!" She's right. Unfortunately, most computer systems do not permit two files with the same file name.

Experience with other, similar systems. If we know that the end users of our new text editing system have used other text editing systems, then we can assume that they will be on the lookout for facilities to delete lines, do block moves and so on. These operations will not require a lot of explanation.

Previous experience with this system. In many ways, this source of previous knowledge is the most interesting.

From the moment that an end user logs on to a system, he is trying to construct a mental model of how things work. If the system lends itself to a clear mental model, users will catch on quickly.

The Apple Computer, Inc. Macintosh-type of interface does a superb job in this area, which remains the main reason people find the micro so easy to learn to use. End users quickly catch on to the concepts of pull down menus and "grabbing" objects with the mouse. Once they have learned these concepts, users can apply them throughout the system.

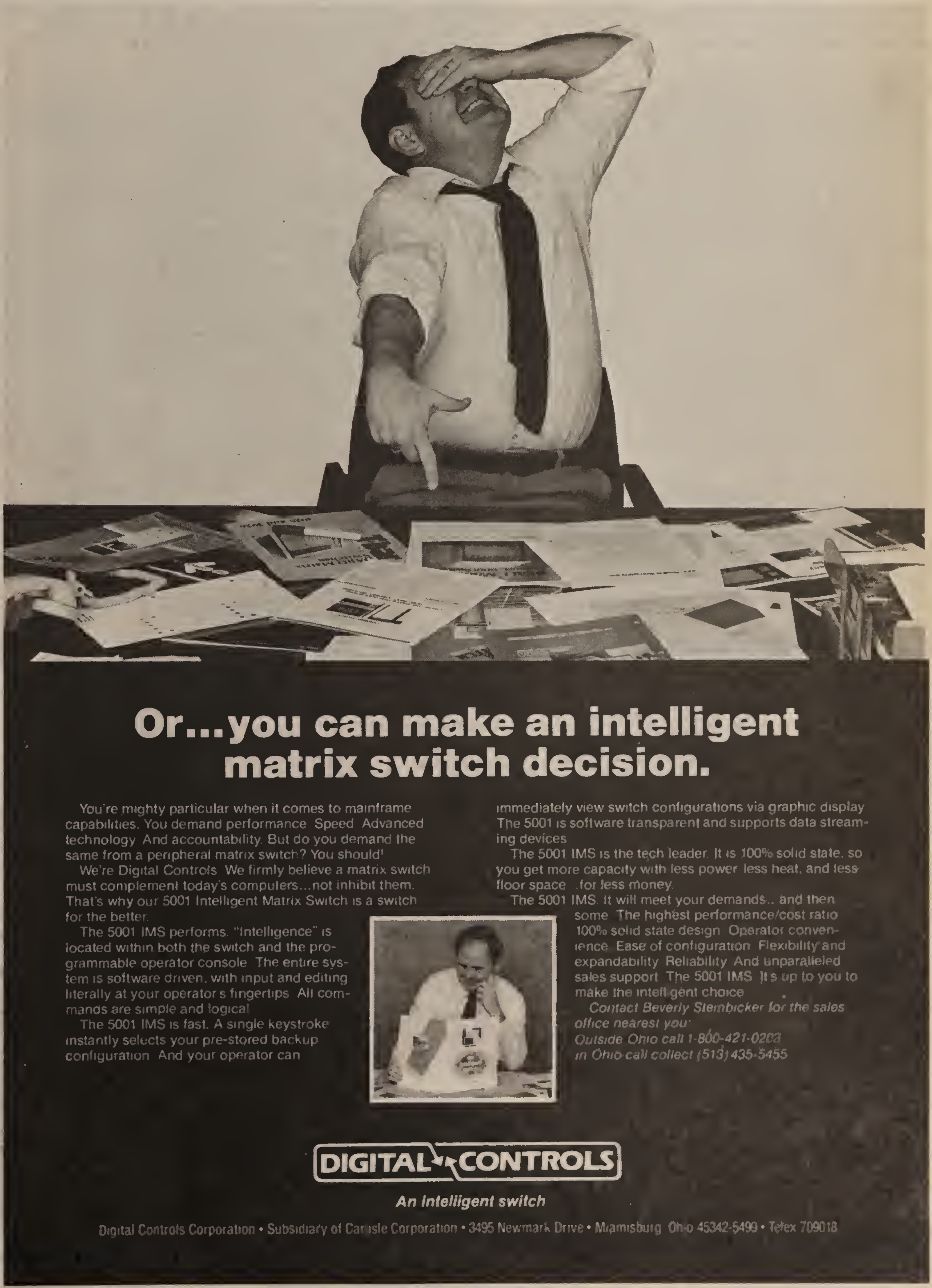
This last point, consistency, is extremely important in interface design. Consistency allows a user to generalize what he has learned. The ability to generalize has two benefits — shorter learning time and fewer mistakes after the system is learned.

Software goodness

There is a "hierarchy of software goodness" that goes like this:

- Transparency.
- Intuitiveness.
- Predictability.

If a system cannot be totally transparent, the next best thing is to be intuitive. When it cannot be intuitive,



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it can at least be predictable.

By definition, a system that is not predictable is quirky. Predictable is another way of saying consistent. The rule of consistency calls for no context-dependent actions. If a certain key does something in one environment, it does that in all environments in a consistent system.

Note that programmable function keys generally violate consistency, as do modes. The problem with modes lies in human factors. We are not very good at remembering whether we are in edit mode, input mode or update mode.

If the meaning of actions changes according to what mode the end user is in, he will make mistakes. Interestingly, mode errors do not decrease much with experience. They bite old pros almost as often as newcomers. The moral is, avoid modes and context-dependent actions.

”

If the way you scroll up a page is to hold down four keys and hit the fifth with your nose, that is not very intuitive. But if that is always the way you scroll up from all environments, then it is at least predictable.

To illustrate the difference between intuitive and predictable, consider this. If the way you scroll up a page is to hold down four keys and hit the fifth with your nose, that is not very intuitive. But if that is always the way you scroll up from all environments, then it is at least predictable.

Before we finish the discussion of transparency, let's look at one of the most important breaks in transparency — making the user wait.

When end users have to wait for the system, they are forced to notice the system. Yet the problem of waiting is not so much the waiting itself. People wait for all sorts of things every day, sometimes more happily than others. The problem is how the user feels about waiting.

People are happier if they know how long they will have to wait. With software, it is frequently possible to estimate the length of a wait. For example, in transmitting a file, if you know the size of the file in bytes and the bit-per-second rate for the transfer, you can predict the time that it will take. Crosstalk by Microstuf, Inc. tells the end user the estimate and asks if he wants to continue. It's effective.

People are happier if they feel that the wait is justified. If the end user expects that the operation is one that will take a while, like a compile, he will be more willing to wait. If the user has no expectation of how long it will take, he will gain one if we show him the work involved.

We once delivered a pre-production version of a system to a customer for testing. For debugging purposes, every 10th record during a long write to disk was also written to the screen. We explained to the customer that the display only served debugging purposes and would not appear in the production version.

The customer's reaction surprised us. He liked seeing all those records scrolling up the screen. His reaction was, "Hey, look at all the work it's doing!" At the customer's request, we left the display in the production version. An appreciation of the work involved made him more tolerant of the delay. So, show some action.

People are happier if they know how things are going. Messages such as LOADING FILE 4 (OF 7 FILES) or, on a spreadsheet, CELLS TO RECALCULATE = 2,794 give the end user a feel for where in the process things are. In any count, it is important for the count to start at the top and count down to zero. If the message in the spreadsheet example says CELLS RECALCULATED = 1,450 and counts up, the user has no way to judge when the end will be reached.

Closure points to reduce frustration. A closure point is a psychological point at which the end user has completed a unit of work. After completing a unit of work, such as issuing a Save or Reformat command, he is more willing to accept a wait.

A common violation of closure points is performing an automatic backup of a text file being edited while the user is typing in a line. This unnerves the user, whereas if this occurred at the end of a sentence or better yet, a paragraph, it would be much better tolerated.

Bars show progress. A progress bar is a simple but effective way to show the user how an operation is progressing. Display a line with zero at one end and 100% at the other. As the operation proceeds, a highlighted bar grows toward the 100% mark, perhaps in 5% increments to reduce line traffic. This works well because it is visual. At a glance, the user can see that the machine is alive, can see how far along the process is and can estimate the time to completion. A number of commercial products use progress bars.

Resilience — the R in TROPICS

The formal definition of resilience reads as follows: The software accepts minor deviations from the correct response and handles them gracefully. The informal definition says: The software can take a joke.

Because resilience involves anticipating what the end user probably meant to do within the context, it is

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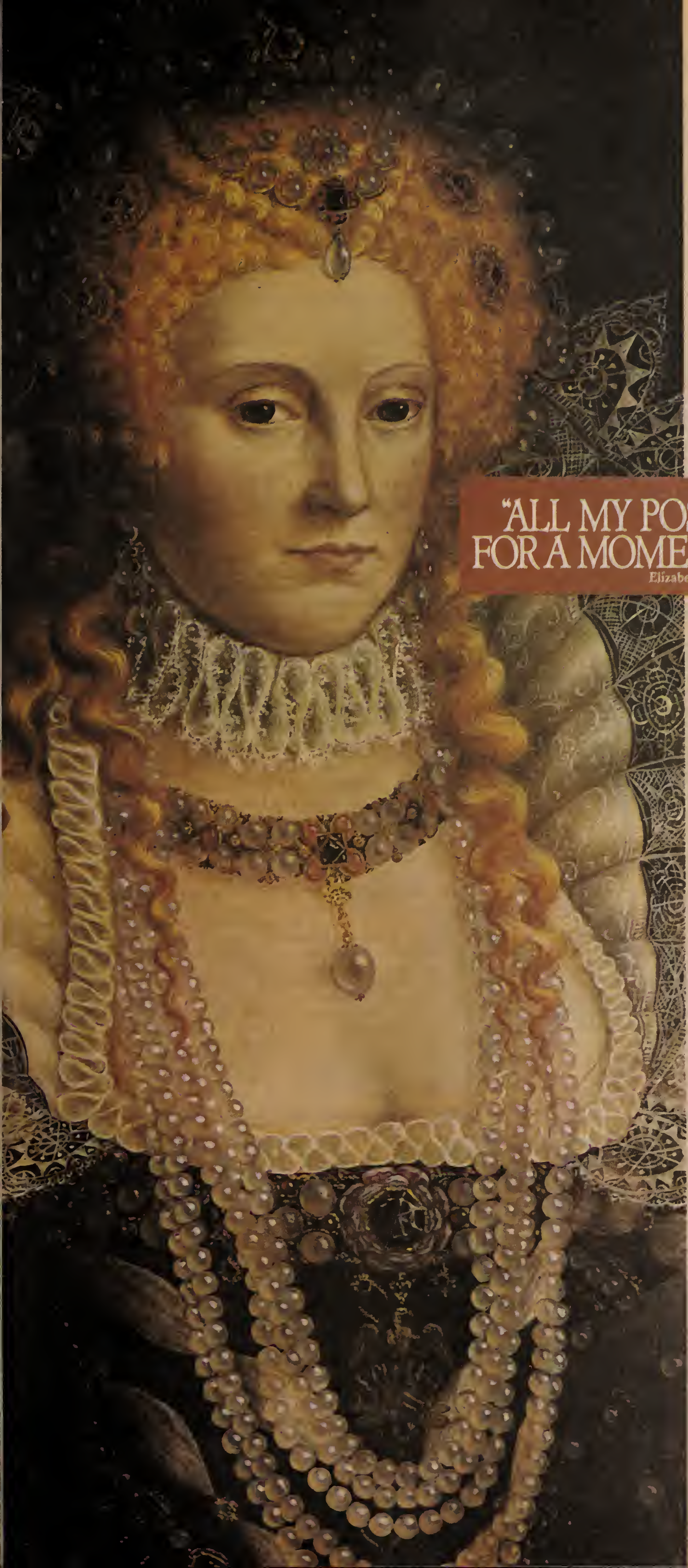

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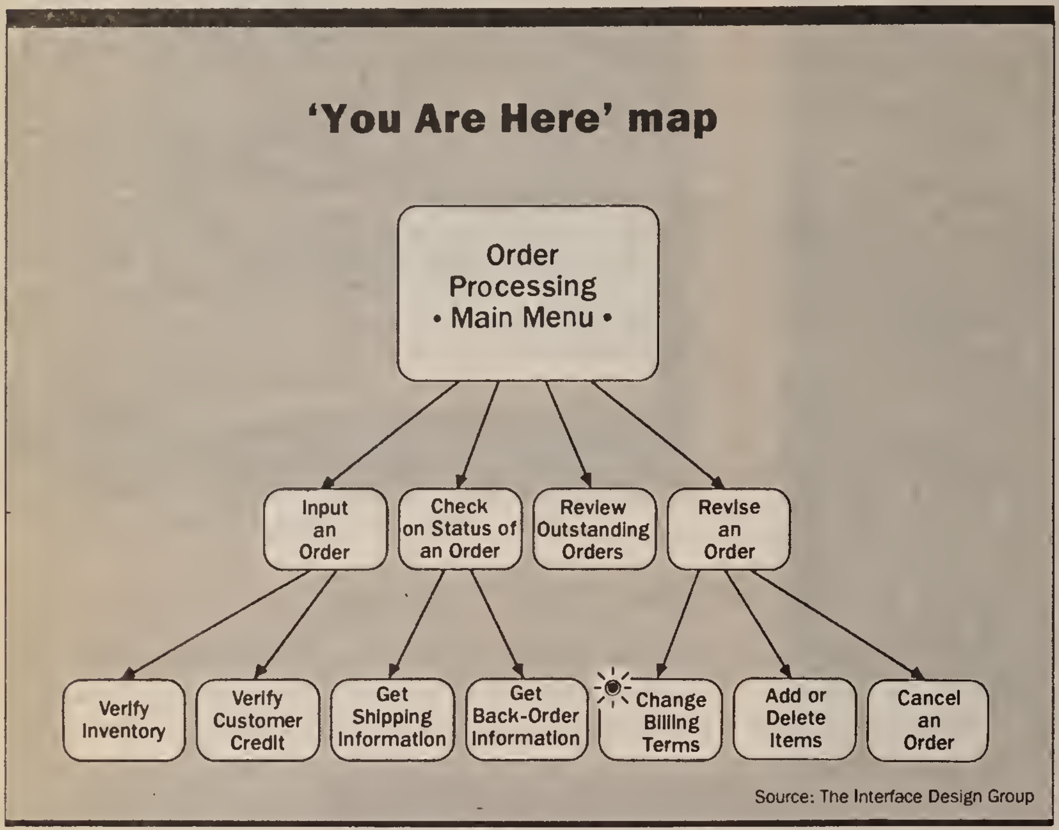

Source: The Interface Design Group

Figure 1. This Help screen, called up by a single keystroke, uses a blinking cursor to show end users their exact position in the menus' tree structure.

a rich applications area for artificial intelligence. But until the artificial intelligence messiah arrives, we can do a surprising amount with normal intelligence.

An easy way to increase resilience is through flexible syntax. For example, how many times have you been trapped in a system, unable to find the magic word to get out? This is one of the most commonly cited problems for new users.

Because of its rigidity, the software forces us to play "20 questions." We have to try QUIT, STOP, END, EXIT, HALT, GOOD-BYE, LOGOFF, SIGNOUT and so on, until we either get lucky or turn off the power in frustration.

One solution: Accept them all. There are only so many ways to say good-bye, and we can put them all in the command table, then map them to FINISH or whatever the original word was. This requires almost no programming effort or overhead in execution. It is a boon to everyone who is new to the system or who moves between a number of systems.

The concept of flexible syntax is extensible. If the user is working on a document or a spreadsheet and says SAVE, FILE, KEEP, RECORD, ARCHIVE and so on, we can use the same technique. Obviously some caution is called for, because the meaning has to be unambiguous, and it is risky for destructive operations.

But this approach does provide the end user with the impression of considerable intelligence in the system — or in the system's designers.

Are errors worthless?

Another way to increase resilience is to analyze user errors. Instead of discarding the input as an error, we can often guess what the user meant and ask him to confirm it. Imagine the impact on a word processing user who was repeatedly scrolling off the right-hand edge of the screen if the system, observing this, were to ask, EXCUSE ME, ARE YOU TRYING TO SET THE MARGINS?

This is not as difficult to do as it may seem, because most application systems operate in a very limited domain. Further, within that domain, the user is already within a certain context — editing, for example. This makes intelligent guessing easier.

The key is to do what systems like those in video adventure games do: "watch" the user. That is their job. Most other systems ignore the user except as a mechanical source of input. Watching the user and trying to anticipate his intent is harder than just grinding out code. But it is not that much harder, and it can pay big dividends in terms of usability.

Orientation

All end users need a ready source of answers for the four questions they are constantly asking themselves:

1. Where am I?
2. What can I do from where I am?
3. How do I get out?
4. How can I get to other places I have either been to or know about?

Question one — "Where am I?" — has two meanings: "Where am I within this system of screens?" and "Where am I within the current document or process?"

The first meaning can be answered in a simple way by always displaying the current location within the system on the screen, for example, Order Line Update Screen. We will see a more sophisticated way to address this when we look at the answer to question four.

The second meaning — "Where am I within this document?" — can be answered by a common type of visual display that represents the total document length as a line on the screen, with a marker showing the current position within it. This is appreciated by people using a text editor for a long file.

Question two — "What can I do from where I am?" — is answered very nicely by the Macintosh's pull-down menus, in which the currently active options are shown in boldface, and the inactive options appear at half intensity. You can make similar distinctions in a more conventional system by displaying possible commands.

Question three — "How do I get out?" — has already been answered in the section on resilience. An alternative method is always to display exit instructions on the screen, such as Hit ESC Key to Exit.

Question four — "How can I get to places that I have either been to or know about?" — comes to grips with the fundamental problem of the user lost in a maze of screens and menus. An incredible amount of the user's time is spent trying to navigate through the system.

Here is a proposed solution: provide a "You Are Here" map (Figure 1). This is just as useful in a computer system as it is at Disneyland. The figure shows a map of an order entry system. By pressing the Where Am I? function key, a user sees this picture. The flashing cursor in Change Billing Terms indicates the user's present position.

Suppose that the user desires to go to Input An Order. Current systems require the end user to navigate through the system, up to the main menu and then down to Input an Order.

This is an attempt to create system-friendly users instead of user-friendly systems. We are asking the end user to hold the system's hand while it does its housekeeping. It requires that the end user learn the structure of the system and the commands necessary for navigation — a major violation of the transparency principle.

Why not let the end user simply move the cursor to the desired place on the "You Are Here" map and then appear there as if by magic carpet?

Productivity

The "P" in TROPICS — productivity — consists of those software features that help end users accomplish their tasks with minimal efforts. These include command structure, screen design and menu design. The software helps users get the job done as easily as possible.

The key concept here lies in a quote by Alan Kay, one of the luminaries in interface design: "Simple things should be simple; complex things should be possible."

The second half of this quote describes power in software; the first half is even more important. Software in which simple things are difficult is not likely to win broad user acceptance, but this type of software appears all too often.

The culprit is someone who decides "Well, logically, operation X is a special case of operation Y, so we could just have one command that . . ." The result is confused users.

Keep simple things simple.

Another aspect of productivity is

> **"**
>
> ***Imagine the impact on a user if the system were to ask, EXCUSE ME, ARE YOU TRYING TO SET THE MARGINS?***

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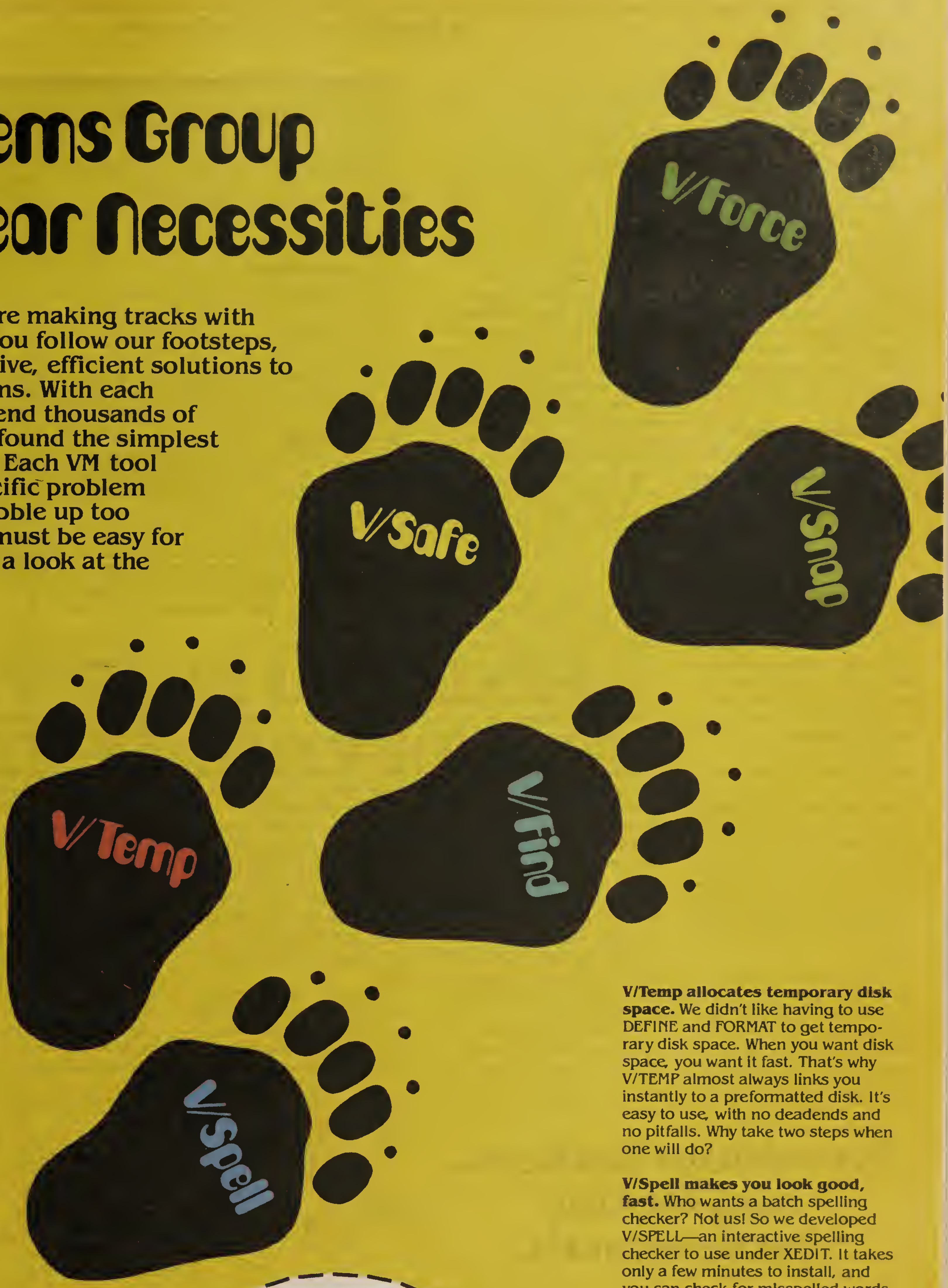

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Solving the Hard VM Problems

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a "fast path" for experienced users. These users want to bypass the tedium of menus by using one- or two-letter commands. They know exactly where they want to go, and they want to get there quickly. Experienced users also want shorter sequences, fewer messages and less confirmation.

By providing a fast path, the system can offer an infrequent user the support of menus, while giving experienced users commands to use the same system more efficiently.

Screen design

Screen design has received an increasing amount of attention in the last few years and justifiably so. However, it is only a small part of the user interface.

Screens represent the outer surface of the interface. Screen design is important not because screens are the heart of an interface, but because good screens serve as a prerequisite for building a usable interface. Here are some guidelines for designing good screens:

- Do not crowd the screen. Good screens look good.
- Use highlighting, blinking and reverse video sparingly. The purpose of these features is to direct and focus the user's attention to a particular area, for example, a field that is in error. Overuse will lead to operator fatigue.
- Use color sparingly. Just because you have 16 colors to use doesn't mean you have to build a video game. Also, remember that about 10% of the male population is color blind, so color should not be the only way to recognize something.
- Limit the amount of information on each screen to what is necessary, with this proviso: Do not force the end user to remember things from one screen to the next.
- Minimize cursor movement. A jumping cursor means increased eye movement. This causes the operator eyestrain, which leads to headaches and a higher error rate. Lay things out in columns, starting in the upper left-hand corner and moving down the columns. Put extra-long items across the top or bottom of the screen.
- Minimize keystrokes. For example, a social security number may be typed in as 013320811 but displayed on the screen as 013-32-0811.
- Show the maximum permissible length of an input field with underscores, highlighting or brackets.
- Exceptions for data entry: First, make the screen mirror the input document even if it is a mess. Data enty operators do not look at the screen, they look at the input document. Forcing them to translate between two formats will greatly decrease productivity.

Second, let operators correct errors all at once at the end of a document, rather than as each error comes up. Professional data entry operators get into a groove as they fly through a document. Having to pause to fix errors both annoys them and slows them down.

Another productivity factor, menu design, relates closely to screen design. Here are some guidelines for menus:

Error message example

User input

```
DISPLAY SALES WHERE
QTR = 4 AND
REGION = NW AND
SALESMANN = THOMPSON AND
PRODUCT = SHEET METAL.
```

Error messages

Terrible:

```
IQF441: ILLEGAL SYNTAX>
```

Bad:

```
UNKNOWN TERM: SALESMANN
COMMAND?>
```

Better:

```
UNKNOWN TERM: SALESMANN
HIT ESC TO CANCEL COMMAND,
OR ENTER REPLACEMENT>
```

Best:

```
UNKNOWN TERM: SALESMANN
DO YOU MEAN SALESMAN (Y/N)?
IF (N:) HIT ESC TO CANCEL COMMAND,
OR ENTER REPLACEMENT>
```

Source: The Interface Design Group

Figure 2. The best error messages leave out unnecessary numbers and unsettling terms like "illegal"; instead, they tell end users what went wrong and what to do next.

Menus work best for highly structured tasks in which the designers can anticipate what choices the end user may want to make at each juncture. For unstructured tasks, menus can be uncomfortably restrictive.

The choices offered on each menu must be clear and encompass all the possibilities — not for the designers, but for the end users. If the choices do not meet these criteria, problems will occur in use. Prototyping pays off here.

Three to six choices on a menu are optimal; eight is a practical maximum. According to Henry Simpson, who wrote *Design of User-Friendly Programs* (McGraw-Hill, Inc., New York, 1984), when confronted with more than eight choices, short-term memory is overloaded, and the menu becomes essentially a directory.

Simpson suggests that when you are faced with a toss-up, go wide rather than deep. For example, if there are 64 ultimate choices, choose a two-layer menu of eight choices, each showing eight subchoices on a submenu (8x8), rather than three layers of depth, each with four choices (4x4x4). A three-layer menu increases the complexity of the structure that the end user must negotiate. This results in more confusion than having a larger number of choices on a menu.

Order the items on a menu from most frequently invoked to least frequently invoked. If you are not sure what the order is, run some tests with a prototype and capture statistics on the users' selections. Discard unused options.

Keep the menu options and the selection prompt brief. Users do not like wordy choices once they have used the system a few times.

Integrity

Integrity, the "I" in TROPICS, means preserving the integrity of the end user's data and his work efforts. Basically, this is damage control.

For the most part, features that promote integrity are obvious. Ask the user to confirm dangerous operations: THE FORMAT COMMAND WILL ERASE ALL FILES ON THIS DISK. DO YOU WISH TO PROCEED? (Y/N)?

The Undo command is a major step forward in computer systems. Its most important effect is not that it lets end users undo an action, such as erasing a file. The biggest benefit is that users relax and speed up, knowing that nothing they do will have irrevocable consequences.

Undo is not simple to implement. It requires considerable thought to decide what the command should do in all cases. But the payoff in productivity makes implementing Undo worth the effort.

Help in many forms

Another protector of integrity is a Help screen. There are four kinds of help:

Long afternoon help. The manual has been placed online, and the user pages through it to find the information he needs. It's going to be a long afternoon.

Selective help. With selective help, the user can choose predefined topics. Help is available for editing, file maintenance, setting options and so on.

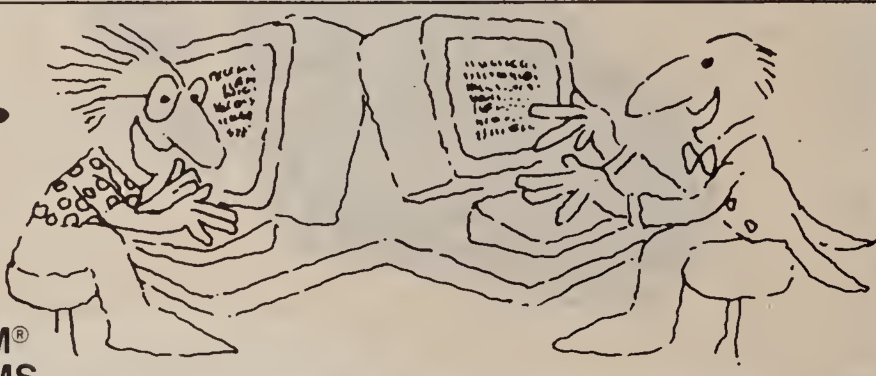
Context-sensitive help. Here the software is smart enough to know what the user was doing at the time that he requested help. If the user was editing a file, information specific to editing is presented.

A good implementation also notices what command the user was trying to use and presents specific information about the command. If an error message has just been received, the system knows this and makes constructive suggestions.

Keyword help. In keyword help, the user can type HELP MARGINS and get help about margins even though there is no MARGIN command.

Keyword help essentially takes the index of a good

For serious hackers... and serious professionals.



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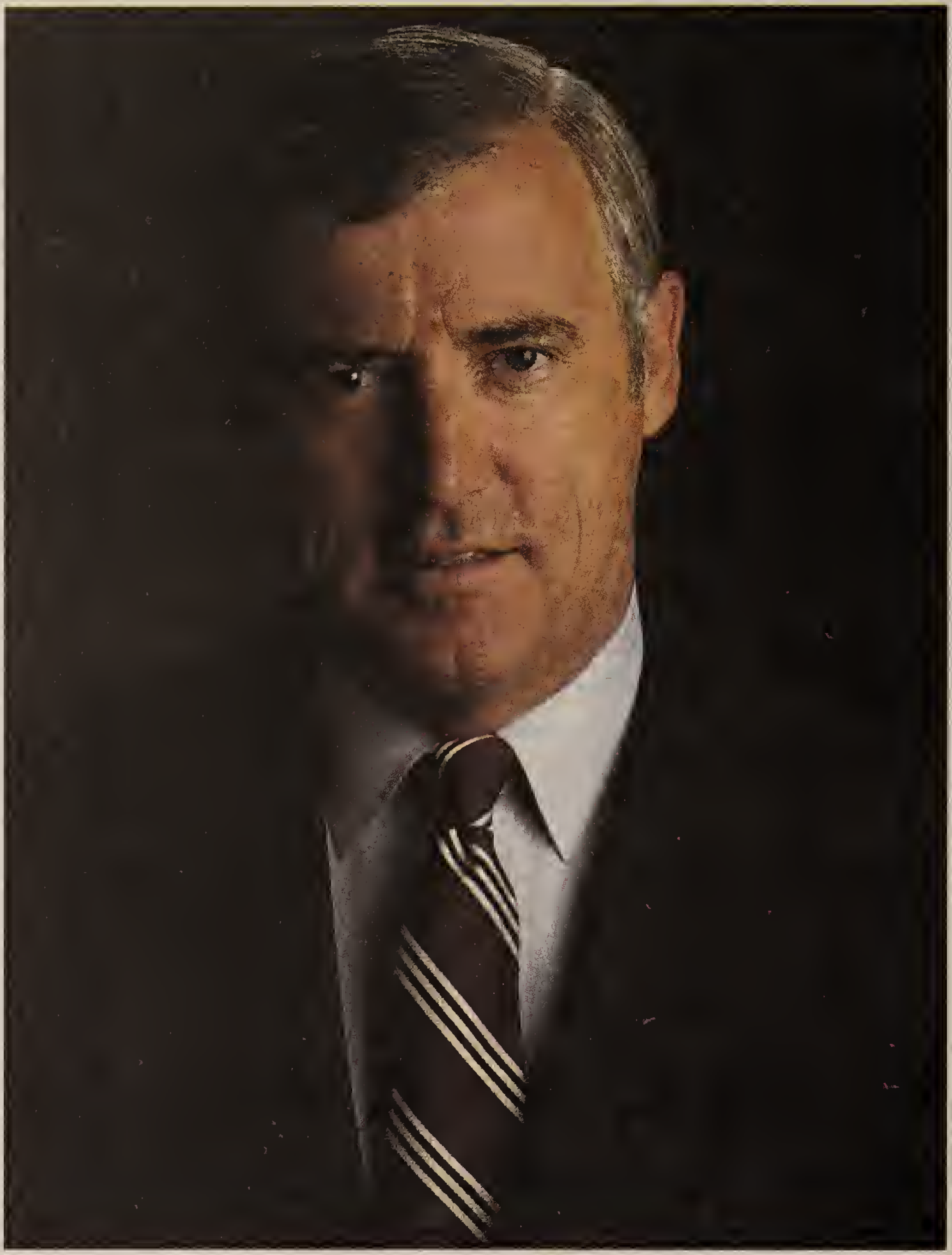


When Cullinet Software was founded in 1968, it was one of the first companies created to specialize exclusively in computer software products. We felt it was time to stop re-inventing the computer software wheel.

But remember, this was 1968—the era of hardware myopia. There were some who said we could never succeed.

Others had tried and failed. "Why," it was asked, "would Cullinet succeed?"

First, we had the belief that there is no substitute for superior products. When Cullinet introduced IDMS, it pioneered the concept of integration via an active dictionary-driven database management system. And we've achieved many other technical firsts since then:

The first back-end database machine prototype and distributed database system; the first, and only, teleprocessing monitor built for IBM computers in the last ten years; the first online Applications Development System (ADS/OnLine) for complex, high-volume applications; the first, and only, 4th-Generation Applications Software; the first transparent integration of personal computers with mainframe systems; the first implementation and full integration of database, applications, and information center/PC software, and much more.

More importantly, we also brought to the industry a standard of excellence and financial maturity. And a financial stability that is a matter of public record. A stability that enabled us to become the first computer software products company to be listed on the New York Stock Exchange, and to be cited for many of our achievements in growth and management by leaders from the business and financial communities.

As proud as we are of all these accomplishments, however, we are proudest of the special relationship that exists between ourselves and our customers. Cullinet has brought to the software industry a characteristic common to all successful companies: we are "user-driven." We understand clearly that we are in business to serve the needs of our customers. And this understanding shapes everything we do.

It is this emphasis on customer requirements and satisfaction that has resulted—year after year, in survey after survey—in Cullinet's top ranking in the categories of vendor support, documentation, training, and overall user satisfaction.

We have built an uncommon loyalty among our users because they understand that we truly care about them. It's that simple.

J J Cullinane

John J. Cullinane
Chairman of the Board

These are five of the reasons why Cullinet is the leader and most respected company in the computer software industry.

1. Number One in Industry Sales

INDEPENDENT SOFTWARE VENDORS
Software News' Top 50 Independent Software Vendors

CULLINET SOFTWARE, Westwood, MA	$144,000
LOTUS DEVELOPMENT CORP., Cambridge, MA	140,000
MICROSOFT, Bellevue, WA	123,000
MANAGEMENT SCIENCE AMERICA (MSA), Atlanta, GA	120,000
APPLIED DATA RESEARCH INC. (ADR), Princeton, NJ	90,000
COMPUTER ASSOCIATES INTERNATIONAL (CAI), Jericho, NY	81,000
INFORMATION GENERAL, Woodland Hills, CA	74,000
DUN & BRADSTREET (D&B), Wilton, CT	70,000
UCCEL CORP., Dallas, TX	68,000

1984 U.S. Revenues ($000)

While Cullinet never expected or sought to become the largest software company in the world, it still is a significant accomplishment.

Source: Software News

2. Number One in DBMS Sales

Intentions to Buy DBMS

	1983	1984	1985 (YTD)
CULLINET	173	206	148
IBM (IMS)	147	180	79
ADR	76	130	64
IBM (DB2)	2	47	50
IBM (DL/I)	158	140	49
IBM (SQL)	81	110	48
SAG	91	100	46
CINCOM	38	72	17
CCA	17	21	11

Buying preference for IDMS/R is increasing because as more buyers become more knowledgeable in database technology, they recognize the technical advantages of IDMS/R over competing products.

Source: Computer Intelligence Corporation

3. Number One in Manufacturing Applications

Software Category: Inventory control

Percent of Installed User Base 1982		Percent of Installed User Base 1983		Percent of Installed User Base 1984		Percent of Sites Considering Vendor For 1985	
IBM	45.5	IBM	41.8	IBM	38.4	Undecided	28.9
MSA	7.1	Burroughs	5.8	Comserv	8.8	Cullinet	18.7
Hewlett-Packard	4.7	Comserv	5.8	Walker Interactive Products	8.8	Xerox Computer Services	15.7
Honeywell	4.7	American Software	4.7	MSA	5.5	Comserv	10.8
American Software	5.5	Honeywell	4.7	Sperry Univac	5.5	IBM	10.8
Sperry Univac	5.5	Martin Marietta	4.7	Burroughs	4.1	ASK	7.0
Arthur Anderson	2.4	NCR	3.5	NCR	4.1	Boeing Computer Services	5.0
Burroughs	2.4	Sperry Univac	5.5	American Software	2.7	Lawson Associates	2.8
Comserv	2.4	Cullinet	2.3	Arthur Anderson	2.7	All others** (5 firms)	20.7
DEC	2.4	Rath & Strong	2.5	Cullinet	2.7		
Martin Marietta	2.4	Software International	2.5	All others* (15 firms)	20.7		
Qantel	2.4	Thomas, Laguban & Associates	2.5				
TRES Systems	2.4	Xerox Computer Services	2.3				
Walker Interactive Products	2.4	All others (12 firms)	14.0				
Xerox Computer Services	2.4						
All others (10 firms)	11.4						

Software Category: Purchasing management

Percent of Installed User Base 1982		Percent of Installed User Base 1983		Percent of Installed User Base 1984		Percent of Sites Considering Vendor For 1985	
IBM	44.1	IBM	28.0	IBM	38.0	Cullinet	18.0
MSA	8.8	Walker Interactive Products	12.0	Walker Interactive Products	10.0	MSA	18.0
Walker Interactive Products	6.8	Comserv	10.0	Comserv	9.0	Xerox Computer Services	18.8
Hewlett-Packard	5.1	American Software	8.0	Sperry Univac	6.0	Comserv	10.7
American Software	5.4	Cullinet	8.0	Cullinet	6.0	IBM	10.7
Arthur Anderson	3.4	Burroughs	4.0	Data Design Associates	4.0	Undecided	8.7
Comserv	3.4	Honeywell	4.0	MSA	4.0	American Software	4.5
McAuto	3.4	Martin Marietta	4.0	ASK	2.0	ASK	2.8
Qantel	3.4	Thomas, Laguban & Associates	4.0	Cincom	2.0	Lawson Associates	2.5
All others (12 firms)	20.2	Xerox Computer Services	4.0	All others* (11 firms)	19.0	All others** (5 firms)	7.9
		All others (9 firms)	18.0				

Software Category: Bill of material processing

Percent of Installed User Base 1982		Percent of Installed User Base 1985		Percent of Installed User Base 1984		Percent of Sites Considering Vendor For 1985	
IBM	50.8	IBM	45.8	IBM	45.8	Cullinet	24.8
Arthur Anderson	5.2	Comserv	8.3	Comserv	9.1	Xerox Computer Services	25.9
Hewlett-Packard	5.2	Honeywell	8.8	Sperry Univac	7.3	Undecided	22.7
Comserv	3.9	Burroughs	4.2	MSA	5.5	Comserv	18.8
Honeywell	3.9	Martin Marietta	2.8	Arthur Anderson	5.8	ASK	5.9
Cincom	2.8	MSA	2.8	NCR	3.8	IBM	2.8
GMO Systems	2.8	Rath & Strong	2.8	Walker Interactive Products	5.8	All others** (4 firms)	3.5
Martin Marietta	2.8	Software International	2.8	ASK	2.8		
NCA	2.8	Thomas, Laguban & Associates	2.8	Cincom	2.3		
Qantel	2.8	Xerox Computer Services	2.8	Cullinet	2.2		
Sperry Univac	2.8	All others (13 firms)	18.0	Rath & Strong	2.2		
All others (12 firms)	15.8			Software International	2.2		
				All others* (8 firms)	12.2		

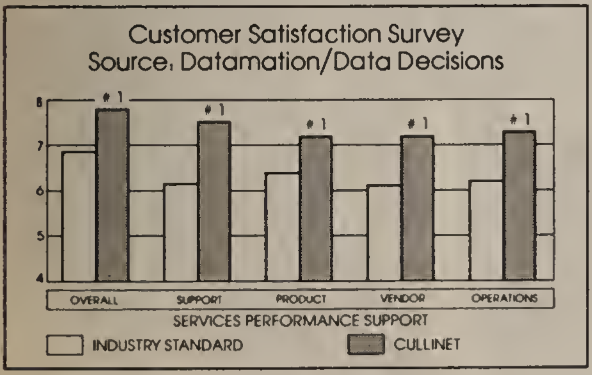
Software Category: Master production Scheduling

Percent of Installed User Base 1982		Percent of Installed User Base 1983		Percent of Installed User Base 1984		Percent of Sites Considering Vendor For 1985	
Not included in 1982		IBM	58.7	IBM	34.0	Undecided	27.0
		Comserv	12.5	Comserv	11.4	Cullinet	19.3
		Honeywell	8.1	MSA	8.4	Xerox Computer Services	11.7
		Martin Marietta	8.1	NCR	6.4	Comserv	9.5
		Burroughs	4.1	Software International	4.3	IBM	9.5
		MSA	4.1	Sperry Univac	4.3	Arthur Anderson	4.7
		Thomas, Laguban & Associates	4.1	Thomas, Laguban & Associates	4.5	ASK	4.7
		Xerox Computer Services	4.1	ASK	2.1	Cincom	4.7
		All others (11 firms)	22.4	Cullinet	2.1	Honeywell	2.2
				Martin Marietta	2.1	All others** (4 firms)	8.7
				All others* (14 firms)	22.9		

Source: Software News

Buyer surveys show convincing proof that Cullinet's 4th Generation manufacturing applications are the way of the future.

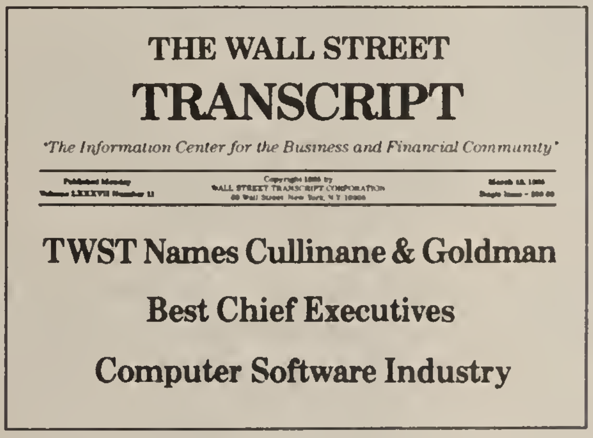
4. Number One in User Satisfaction



When it comes to vendor support, Cullinet is rated Number One year after year in every category.

Source: Datamation/Data Decisions

5. Number One in Management



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Source: The Wall Street Transcript

The Leader in Information Systems Software

Cullinet

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manual and lets the user obtain help on any topic he is interested in. This inversion of the standard access method for help information has one very important consequence: It lets the user state his problem in his own terms, not necessarily the terms selected by the designers.

Finally, we will consider the problem of providing help when the user is entering data. A question mark should be acceptable input for any field and should produce a brief explanation of what input is required.

For example, if the user enters ? in response to the prompt ENTER POLICY CODE, the system might return POLICY CODE IS THE FOUR CHARACTER STANDARD RISK TYPE (FIRE, HOME, LIFE . . .).

This message should be brief, since it is all that many end users will require. To provide more detail, the help can be layered: If the user enters ? again, he receives a list of all the legal codes and their definitions.

Control

Control, next in TROPICS, refers to the feeling of users that they are in control vs. the machine being in control. This holds great psychological importance, especially for inexperienced users.

We can do several things to increase end users' feeling of possessing control:

- Construct messages carefully.
- Allow end users maximum freedom in selecting the sequence of events and the format of input data.
- Allow user intervention.

In terms of constructing messages, error messages are the ones to watch out for. Error messages should be brief, clear and nonjudgmental (Figure 2). If there is a problem, we also need to tell the user what to do about it, not just tell him that something is wrong. Here are some tips:

Avoid implying that the user is wrong. Too many error messages translate as "Try again, stupid!" It is sufficient to state that there is a problem. For example, CANNOT FIND FILE 'FRED' ON THE B DISK is infinitely preferable to ILLEGAL FILE NAME.

Avoid words that have unpleasant associations, such as illegal, invalid, failed, killed, aborted and so on.

Be specific, not general. ILLEGAL SYNTAX not only offends or scares end users, but it also does not tell them what is wrong. The program knows what is wrong, and it is simple programming laziness not to tell users. If you must display message numbers, put them last.

Provide a constructive suggestion: DISK IS FULL. USE 'LIST' TO SEE YOUR FILES, 'ERASE' TO DELETE, THEN RETRY 'SAVE' is much better than just DISK IS FULL.

Smart software will not let an end user get a DISK IS FULL message in the first place. The system usually knows both the size of the document and the amount of available disk space. Advise the user that space is running low while he can still save his work.

To ensure error messages are clear, let the user write them. Try asking the end-user department, "What do you want to do if there's a duplicate P.O. number?" The users will come up with something like DUPLICATE P.O. NUMBER. CALL MARY AT EXT. 2664.

This message is much more likely to be meaningful to the users than whatever the system designers could come up with, and it also pays off in better user acceptance.

It is harder for end users to resent a message that they wrote themselves than one that "those idiots over in MIS" generated.

Another way to increase end users' feeling of control is to allow maximum freedom in the entering of data. Author Heckel points out that the freedom of entering cell data is one of the reasons for the spreadsheet metaphor's wide acceptance.

Filling out forms on the screen where only some of the data need be entered also provides the user this feeling of freedom, if he can move around and enter things in any order. Contrast this with systems that force end users to enter data in an exact sequence, in a particular format.

One place to increase flexibility is

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> ***Software in which simple things are difficult is not likely to win broad user acceptance, but this type of software appears all too often. The culprit is someone who decides "Well, logically, operation X is a special case of operation Y, so we could have a command that . . ." The result is confused users. Keep simple things simple.***

INTELLIGEN

It takes more than a PC to make a 3270 network work.

Telex understands the individual needs of managing information. That's why we've introduced the Intelligent System Series.™

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The Telex 1260 is the low cost choice for users seeking IBM XT compatibility and AT performance. Telex's 1280 runs up to 30% faster than the AT and supports both AT hardware and software. Together the 1260/1280 offer a wide selection of memory, storage, peripheral and expansion options to provide for today's needs as well as tomorrow's growth. And they both support a choice of 3278 or AT style keyboards.

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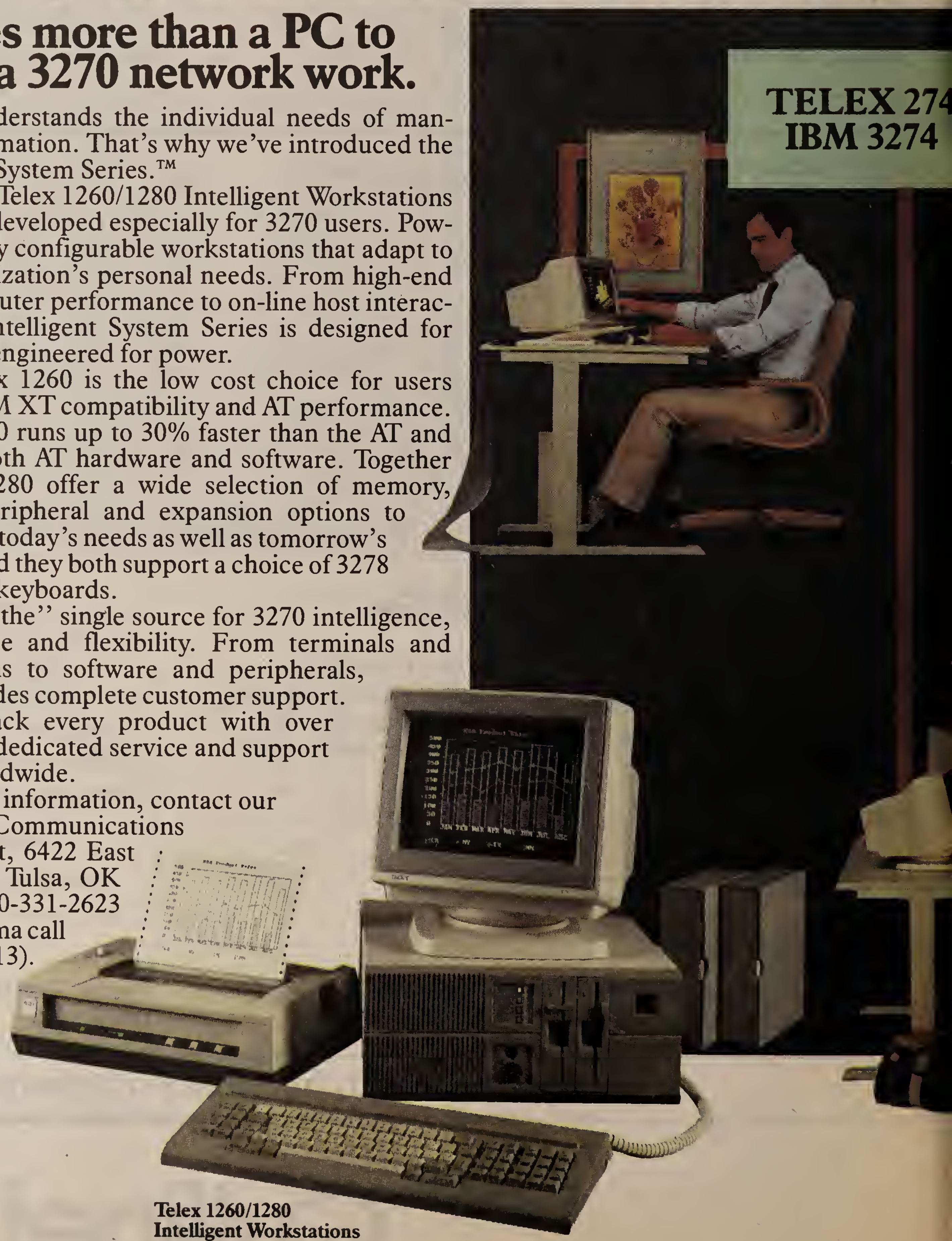

Telex 1260/1280 Intelligent Workstations

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to have flexible input formatting. A general-purpose date processing routine can be written that will assimilate a date given in any reasonable format and convert it to the standard form.

Finally, users should be able to interrupt any operation at any point without loss of data. Few good, technical reasons justify not providing this facility, but interrupt facilities remain surprisingly rare.

There is no feeling worse than helplessly watching the computer plunge onward, mindlessly executing what the user realizes was a mistake — erasing all files, perhaps.

Tailored interface

We have now completed our examination of the TROPICS techniques.

The next step involves tailoring the interface to the target group of end users.

Four variables prove useful for profiling end users and their environment:

- User sophistication.
- Frequency with which users use the system.
- Time pressure on users.
- Error penalty levied by system.

Sophistication in this sense will be high for end users in certain professions — accountants, doctors and pilots.

At the other end of the scale, assume it to be low for systems used by the general public, such as automated teller machines. If the design is to work for all users, we have to assume low sophistication.

Users with low computer sophistication report a strong preference for these features:

- Initiative from the computer. Menus work well; a blinking cursor without a prompt can be terrifying.
- Assurance that the user cannot hurt anything. An Undo function is particularly useful.
- Clear, limited choices.
- Confirmation of successful completion of all operations, for example, YOUR FILE HAS BEEN SAVED.
- Messages that are nonthreatening in tone.

On the other hand, end users with high levels of computer sophistication are interested in the following:

- Shortcuts: direct commands, macros and the like.
- Availability of status information: resources used or remaining, waiting time estimates and so on. Sophisticated users like to know what control facilities are available; they want to set all the options and manipulate the print queue.

The frequency-of-use variable also influences end-user profiles. Users who log on every day or almost every day qualify in the high frequency-of-use category; if they log on only once a month, then they fall into the low frequency-of-use category.

End users with low frequency of use want the following:

- The initiative to come from the computer.
- Orientation and navigation guides.
- Good Help facilities.
- Mnemonic commands.

In contrast, end users with high frequency of use typically want these features:

- Fast paths.
- Minimal keystrokes. They do not care whether things are mnemonic, because they are operating at a reflex level. They do care about not moving their hands excessively and about having commonly used functions one keystroke away.

Time pressure represents the first of the two environmental pressures. An example of an end user with relatively low time pressure would be a manager checking a quarterly budget figure; an air traffic controller, on the other hand, has high time pressure. A retail clerk at a point-of-sale terminal has moderate time pressure.

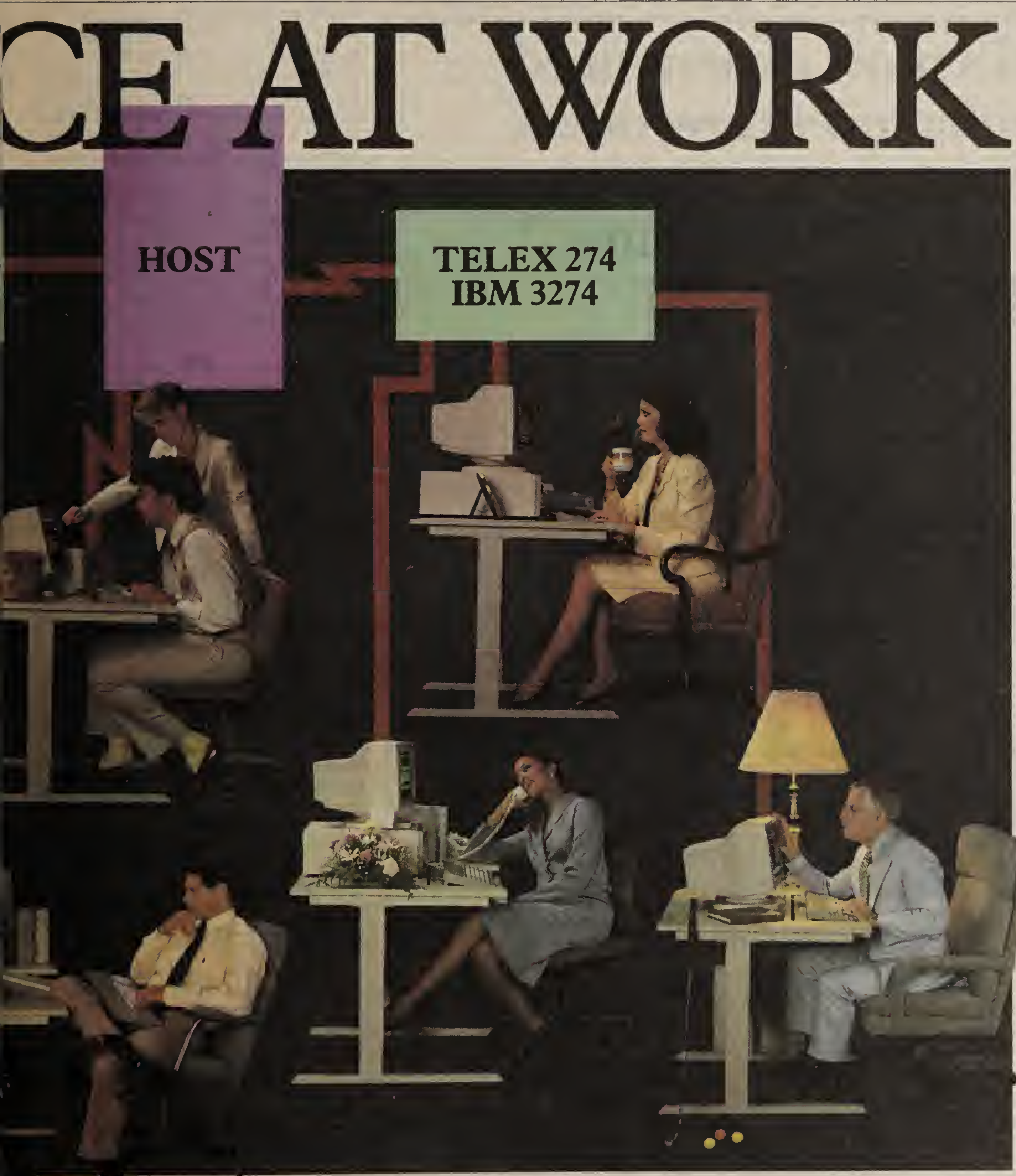
As time pressure increases, users begin to demand a fast path, and system response time becomes more critical.

Error penalty is the other environmental pressure. Determine the penalty by asking, How serious are the consequences of an error? Again, an air traffic controller ranks near the top; a student writing a term paper on a word processor is at the low end.

If the error penalty is high, it is important to minimize the chances of misreading or mistyping. It is also important that data cannot be destroyed.

The effect of time pressure and

Continued on page 66



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Friendly tools take planning

To enjoy the benefits of better user acceptance and decreased support that user-friendly software design can provide, the MIS department needs a plan. The details of the plan will depend heavily on the environment and on what methodologies are being used currently, but here are the essential steps:

Assign responsibility for system usability to one person or group for each project. The "usability group" must work closely with the designers, programmers and end users.

Acknowledge the commitment to software usability publicly. Success comes from letting usability drive the design. The usability group needs the authority to make key design decisions that affect usability.

Train all staff — designers, analysts and development programmers — in the principles and techniques of user-friendly design. This is not difficult and can begin on a project basis.

We have found that a consulting or training firm can give an effective course on principles and techniques in two days, complete with exercises.

Produce a definition of usability requirements early in the development cycle. This document, produced by the usability group, contains the following:

1. The user profile: a description of the target group of end users together with the system characteristics that will be important to them.

2. Design objectives: specific, measurable usability goals or standards that the system must meet. These include learning time, a specific period of training time after which a user with the target background will be able to perform certain operations on the system; performance time, a specified average length of time in which trained users can perform certain operations; error rates, to be less than a specified number for a specified transaction type; and subjective satisfaction, as rated by trained users on a standard system evaluation form.

3. Design constraints: any constraints on the usability of the design, such as hardware limitations and schedule and budget requirements.

Hold an external design review session, including the key designers, programmers, end-user representatives and actual end users. The usability group should conduct this session before physical design is begun.

The review session represents the last chance to evaluate how well the design will meet its usability design objectives and to freeze the interface specifications.

Continued from page 65

error penalty on the design is more black and white than the effect of sophistication or frequency of use. If a system does not meet the requirements of time pressure or error penalty, it will simply not be acceptable to end users for whom these things are critical.

Sometimes objections will be raised in a company about the extra effort required to produce friendly software, usually by those doing the funding. That is a good time to relate the Susan B. Anthony story.

The Susan B. Anthony dollar paralleled a system with no moving parts — simple and efficient, a designer's dream. More important, it worked. The coin stood as legal tender for a dollar, was portable and technically surpassed the system it sought to replace — the $1 bill. It even cost less to produce. Yet the public — the end users — rejected this system so flatly that today the U.S. government has half a billion Susan B. Anthony coins in storage.

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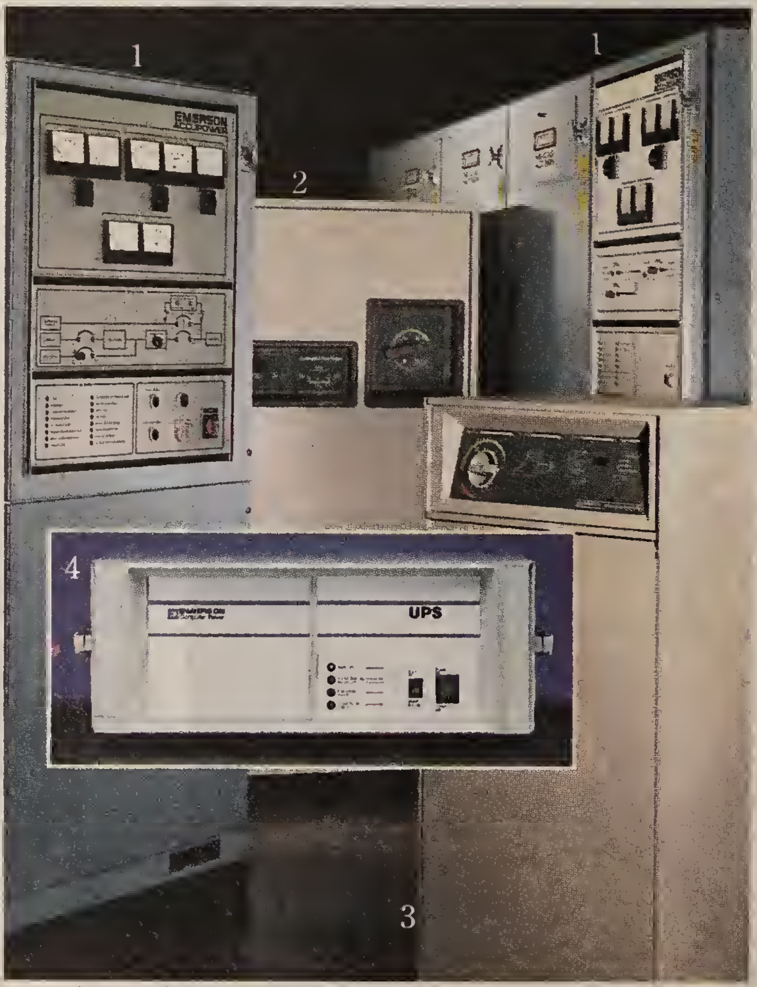
> ***Avoid implying that the user is wrong. Too many error messages translate as "Try again, stupid!" It is sufficient to state that there is a problem.***

The coin failed solely on the issue of user friendliness. It looked too much like a quarter, and there was no place for it in cash register drawers. Furthermore, its small size implied too much about the shrinking value of a dollar.

So the coin was a technically superior $100 million flop. Contrast this with the ubiquitous little yellow stick-on reminder notes called Post-Its. This product also uses no moving parts, yet every year it generates more than $200 million in revenue for 3M Co. Post-Its succeed because they are easy to use and fit nicely into the environment for which they were made. The analogy to software is obvious.

Usability is rapidly becoming a major design issue for systems built in the second half of the 1980s. With a systematic approach, MIS can perform very well in this area. ■

The world's most experienced UPS manufacturer now offers computer protection "From micro to mainframe."



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AP300 Series (Minis)[2]

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AP100 Series (Minis)[3]

With single phase ratings of 3, 5, & 10 kva, the new AP100 Series brings a complete UPS into the office environment to cover a wide number of mini systems requirements. It's quiet, has full monitoring functions, and can meet many power distribution needs.

AP1000 Series (Micro)[4]

Emerson's newest addition provides micro and personal computer protection from 1500 watts down to 200 watts. And, it's backed by Emerson's history of quality and experience.

For more information on the most complete line of UPS systems available, call 1-800-BACKUPS.

Emerson Electric Company, Industrial Controls Division, 3300 South Standard Street, Santa Ana, California 92702, (714) 545-5581 Telex 67-8460

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NEW PRODUCTS

HP programs link network, IBM systems

Hewlett-Packard Co. of Palo Alto, Calif., has added two software programs to its HP Deskmanager, which is part of its Personal Productivity office system that offers electronic mail, word processing, electronic filing and time management programs.

The two software programs, designed to link the HP network to IBM systems, are HP Officeconnect-to-Profs and HP Convert/DCA.

HP Officeconnect-to-Profs allows the HP Deskmanager to support electronic mail exchange with any system running IBM's Professional Office System bisynchronous office support mainframe software. It supports two-way conversion of electronic mail documents.

In addition to electronic mail sharing between HP Deskmanager and Profs users, HP Officeconnect-to-Profs enables users to share word processing documents. The program will be available in the second quarter of 1986 and costs $27,500. A right-to-copy option is available for an additional $19,250.

HP Convert/DCA is said to provide document exchange between HP and IBM word processing formats. It performs two-way conversion between HP word processing formats and IBM Revisable Form Text Document Content Architecture (DCA) word processing formats. This includes HP Word and Advancewrite and IBM Displaywrite 2.

According to the vendor, the program allows personal computer-based DCA documents that contain both text and formatting information to be sent around an HP Personal Productivity Center network, where they are converted automatically to an ASCII or HP Word format. HP Convert/DCA provides all necessary translations between the two systems so the data can be shared and edited by both users.

HP Convert/DCA costs $1,600 for the HP 3000 Series 37 and $4,000 for all other HP 3000 computer systems.

AT&T connection debuts

Integrates digital telephone, micro into one workstation

AT&T Information Systems of Morristown, N.J., has announced a family of hardware and software products designed to integrate personal computers and digital telephones.

Called the PC/PBX Connection, the products are said to allow users to convert their existing personal computer into an integrated voice/data workstation. The user will have on-screen access to more than 200 voice/data features of the AT&T System 75 and System 85 digital private branch exchange (PBX) communications systems and high-speed simultaneous voice/data communications at 64K bit/sec.

The PC/PBX Connection allows the user to perform voice, data and personal computer applications simultaneously as well as to access communications management functions. The products also provide multitasking capabilities to the single-user Microsoft Corp. MS-DOS or IBM PC-DOS operating system.

There are two basic hardware configurations for PC/PBX Connection applications: the 7404D PC cartridge for basic functions and the PC Expansion card for full-function capability.

The 7404D cartridge configuration consists of a plug-in personal computer feature cartridge for the AT&T 7404D voice/data telephone and an MS-DOS or Unix software package. It reportedly supports data communications up to 9.6K bit/sec. Prices for the basic cartridge configuration, available in March, start at $175.

The full-function arrangement consists of PC expansion cards and software packages for MS-DOS or Unix operating systems. The cards can be used with any System 75 or 85 7000 series digital phone. They will support data transfer at up to 64K bit/sec. to other personal computers or to hosts via AT&T's Digital Multiplexed Interface. Optional IBM 3270 terminal emulation software provides access through the PBX to Systems Network Architecture host environments.

Prices for the full function configuration, available in May for the AT&T Personal Computer 6300 and PC 6300 Plus and in August for the AT&T Unix PC, start at $700.

PC/PBX Connection works with most micros operating under MS-DOS and Unix.

TI introduces Pro-CAD 286

The Data Systems Group of Texas Instruments, Inc., located in Austin, Texas, has added the Pro-CAD 286 to its professional computer family configured for computer-aided design.

Pro-CAD 286 features a TI Business-Pro personal computer bundled with Autocad software from Autodesk, Inc. of Sausalito, Calif. Pro-CAD 286 systems are available with either 21M- or 40M-byte Winchester disks.

According to the vendor, the system comes with all internal components installed. The preconfigured packages include the system unit, 640K bytes of random-access memory, 1.2M-byte floppy disk, TI-mode CRT controller, 720- by 300-pixel resolution color display, Intel Corp. 80287 numeric coprocessor, mouse, synchronous/asynchronous plotter interface, Microsoft Corp. MS-DOS 3 and Autocad with Advanced Drafting Extensions-3, the company said.

Suggested list prices are $9,950 for the 21M-byte system and $11,200 for the 40M-byte configuration. Available expansion options include additional memory, disks, communications and an IBM-mode controller for Personal Computer AT-compatible applications.

Pro-CAD 286 systems reportedly support many TI and third-party input devices, plotters and printer/plotters as well as the full range of TI Professional Computer and IBM Personal Computer AT-compatible software.

INSIDE

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Software Bridge out; converts files without added hardware

Systems Compatibility Corp. of Chicago has introduced Software Bridge, a program designed to convert document files between IBM Personal Computer word processing software packages without the need for additional hardware or protocol translators.

Software Bridge is said to create fully editable and printable documents, retaining the function and format codes stripped out by modem and ASCII transfers. The files are converted within the personal computer via a menu-driven program.

The Software Bridge diskette supports conversions to and from any or all of the following: Multimate Corp.'s Multimate, Samna Corp.'s Samna Word and Micropro International Corp.'s Wordstar. It also supports IBM's Document Content Architecture and ASCII file formats. The program runs on any IBM Personal Computer, Personal Computer XT, AT or bus-compatible computer with 128K bytes of random-access memory.

The program is preconfigured to meet most users' needs but can be reconfigured for automatically or manually identifying and inputting files to be converted.

The tool costs $249.

Apricot announces Xen micro

Said to increase processing speeds 60% above AT

Apricot, Inc. of Fremont, Calif., has unveiled the Apricot Xen microcomputer.

Based on the Intel Corp. 80286 running at 7.5 MHz, Xen can reportedly increase processing speeds 60% over the IBM Personal Computer AT.

It also offers zero-wait-state memory and a four-channel direct memory access processor, Apricot said.

A $3,995 Apricot Xen comes standard with a 20M-byte Winchester disk, a 720K-byte floppy disk and 1M byte of random-access memory expandable to 5M bytes, according to the vendor.

It also includes a mouse, six expansion slots, an IBM Personal Computer AT-compatible keyboard with backlit microscreen and both RS-232C and Centronics Data Computer Corp. interface ports, company spokesmen said.

The system can reportedly be upgraded with an internal 20M-byte Winchester disk.

Software provided with Xen is said to include Microsoft Corp. MS-DOS 3.1, Convergent Technologies, Inc. GW Basic, an IBM read-only memory BIOS emulator, asynchronous communications and Microsoft Windows. Windows provides a calculator, calendar, card file, clock, notepad and Digital Equipment Corp. VT100 terminal emulator and reversi game.

According to the vendor, one of the special features of Apricot Xen is the Apricot Softclone, an alternate command emulator that enables Xen to run most off-the-shelf IBM Personal Computer software.

In addition to Softclone, a 5¼-in. floppy disk drive and the Apricot XP expansion box also provide IBM compatibility.

Both add-on facilities are priced at $195, the company said.

SOFTWARE & SERVICES

Systems software

Logic International, Inc. has announced **FMS-36**, integrated financial modules for the IBM System/36.

The modules are General Ledger, Accounts Payable, Accounts Receivable and Payroll. The system supports up to 120 companies and 60 users and allows multiple concurrent usage within the same application. History may be maintained for up to two years in the General Ledger module and for one year in the other applications.

General Ledger and Payroll are priced at $4,000 each. Accounts Receivable is $3,500, and Accounts Payable is $3,000.

Logic International, Suite 105, 5775-A Glenridge Drive, Atlanta, Ga. 30328.

■

SAS Institute, Inc. has announced **SAS/QC** software designed to automate statistical quality control.

SAS/QC is said to pinpoint variations within manufacturing processes so that management can take corrective measures. It includes two procedures for generating Shewhart and cumulative sum control charts. A third procedure provides capability indexes, summary statistics and graphical tools.

SAS/QC supports the IBM 370; the 3030, 3040, 3080 and 3090 series; and the 4300 series and compatible machines running under OS and CMS. It also supports Digital Equipment Corp. VAX 8600 and 11/700 series under VMS. An annual license fee ranges from $1,500 to $7,000.

SAS Institute, Box 8000, SAS Circle, Cary, N.C. 27511.

■

RD Labs, Inc. has announced **Release 3** of **RD/Share**, its shared library facility for IBM's VM/CMS environment.

Features of Release 3 include enhancements to the management reports, automatic copybook and macro cross-reference capability and the addition of user exits to facilitate customization of the security system.

RD/Share Release 3 costs $7,675 for the first CPU and $4,605 for each additional CPU. Yearly maintenance fees are 15% of the purchase price.

RD Labs, Suite A, 1783 Tribute Road, Sacramento, Calif. 95815.

Engineering Systems Corp. has announced **Design Graphix 3-D CADD** software based on the Sperry Corp. 5000 series of computers.

Design Graphix enables the Sperry systems to be flexible graphics workstations suitable for applications such as mechanical, electrical, civil and structural engineering as well as architectural design.

Features include geometric capabilities, text fonts, multiple pens, multiple layers and command-driven or user-definable menus.

Prices range from $7,500 to $14,750.

Engineering Systems, Suite 400, 3636 S. Sherwood Forest Blvd., Baton Rouge, La. 70816.

■

Aim Technology has introduced **Aim Job Accounting** for AT&T Unix system resource management.

Aim Job Accounting analyzes the Unix system files that keep track of login time and CPU use and tracks disk use. It organizes the information by charge rates, rate periods and user groups and saves it for future access. Users are able to access their own resource-use records.

Aim Job Accounting runs on University of California at Berkeley Unix 4.1 and 4.2, AT&T Unix System V, Version 7 and Microsoft Corp. Xenix. The base price is $3,950.

Aim Technology, Suite 390, 4655 Old Ironsides Drive, Santa Clara, Calif. 95054.

■

McDonnell Douglas Computer Systems Co. has introduced **Realgraph**, a graphics package designed to run on the McDonnell Douglas line of Microdata relational data base management systems, including the M6000 and M9000 series.

Realgraph is an extension of the company's English inquiry language. When used together, Realgraph and English allow users to graphically represent most information contained in the system data base. Charts produced include x-y plots, line charts, bar charts, scatter diagrams or pie charts. The user can specify graph or chart size and placement on the page.

The Realgraph system comes with three generic device drive modules. It costs $995 per CPU.

McDonnell Douglas, 17481 Red Hill Ave., Irvine, Calif. 92714.

■

Post-Tron Systems Corp. has announced the **Advanced Retail System** software for IBM's 4680 retail systems cash registers.

The software is said to provide a bridge to the 4680 from previous models of IBM point-of-sale terminals as well as from models available from other vendors. It allows users to upgrade to the alphanumerics or CRT screen displays used in the 4680 and change keystrokes so that keystrokes of earlier machines match those of the 4680. It comes with customized software, documentation and training.

Typical costs for software customization range from $25,000 to $30,000. The cost for an operating system plus a license fee is approximately $750 per store controller.

Post-Tron Systems, P.O. Box 9325, Providence, R.I. 02940.

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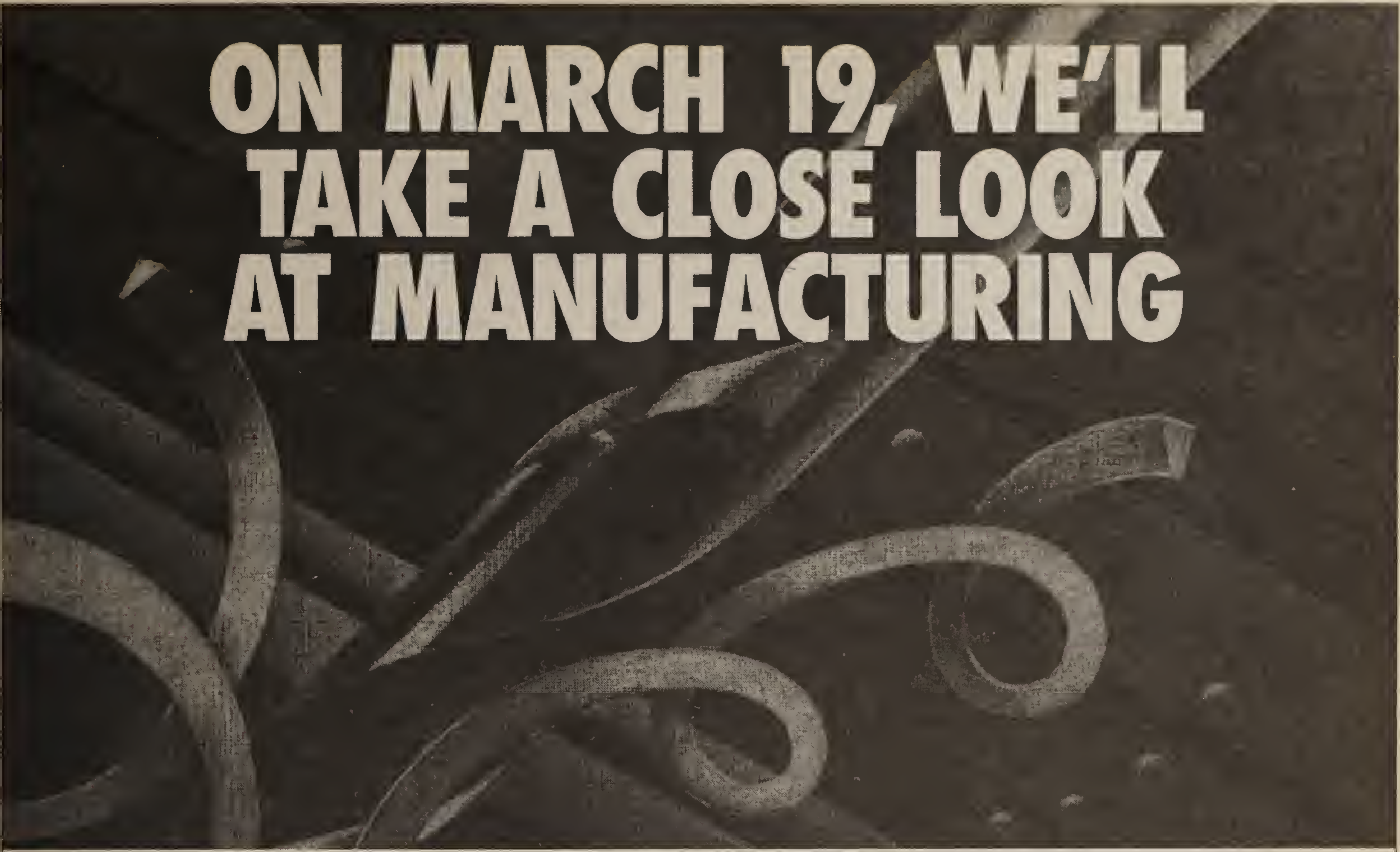

Ultimately, computers will extend to every department in every company. And when they reach the factory floor, the MIS/DP department will be called in to help with the decisions.

That's why any vendor involved in computer-controlled manufacturing will want to be in the March issue of Computerworld Focus, where we'll tackle some of today's biggest issues in computer-aided manufacturing.

MIS/DP professionals will learn what they need to know to make intelligent decisions about integrating design and manufacturing systems within the corporate network. About factory networks, CAD/CAM, robotics and MRP. That way they can make sure the newest methods will integrate smoothly with existing and future systems. And productivity will be improved, not disrupted.

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NEW PRODUCTS/SOFTWARE & SERVICES

Informatics General Corp. has announced **Kwic-File**, an indexing and retrieval system for law firms using Wang Laboratories, Inc.'s VS computers.

Kwic-File identifies and fetches every document in which search criteria occur, even if documents are archived off-line.

It tracks the title, author, operator, comments and various fields of the document summary plus all words located in the body of the document.

The package lets users create a category page in a document for defining their own field names and retrieving data based on text associated with those categories.

Kwic-File costs $10,000.

Informatics General, Systems Division, 7710 Sears Tower, Chicago, Ill. 60606.

Productivity aids

Kolinar Corp. has introduced **SQL/Exec II**, an enhanced version of its VM/CMS product for users of SQL/DS.

SQL/Exec II allows users to execute any SQL command from either Exec2, Rexx or the CMS command line.

It is said to enable users to build a custom data base application. SQL/Exec II supports all SQL commands and statements and requires no preprocessing.

According to the vendor, the product also provides performance data for benchmarking commands.

SQL/Exec II costs $6,000. After one year, optional annual maintenance is $1,125.

Kolinar, 3064 Scott Blvd., Santa Clara, Calif. 95054.

Westinghouse Electric Corp. has introduced **TSOSYM**, a capacity planning tool said to execute multiple TSO programs and provide information on the computing system resources required to perform the programs.

Up to 200 TSO users can be simulated in a single execution, and Logons, Edits and Clists runs are actually performed.

Changes to the operating system can be capacity-tested without involving many users, the vendor said. Program fixes to MVS can be integrity-tested prior to implementation; systems can be benchmarked, and stress and capacity can be tested during off hours.

TSOSYM is priced at $4,250, according to Westinghouse.

Westinghouse, 777 Penn Center Blvd., Pittsburgh, Pa. 15235.

Polaris Systems, Inc. has unwrapped the **Horizon** project management package, a planning and scheduling tool for Hewlett-Packard Co. HP 1000 users.

Menu and soft-key driven, the software contains a Pert and Gantt module plus on-line documentation. While a user creates the Pertchart, Horizon scales it graphically to display relationships between paths and events and then calculates the critical path and associated Gantt charts.

Horizon also provides an on-line free-form memo capability for each project.

The package ranges in price from $1,500 to $8,500.

Polaris Systems, Suite 203, Summit Corporate Center, 2329 Highway 34, Manasquan, N.J. 08736.

■

Uccel Express Software has added an automatic reblocking option (ARO) to its **Blockmaster** block size optimization program for MVS environments.

The ARO is said to reblock automatically all sequential data sets that are inefficiently blocked to reclaim unusable I/O resources. Selection criteria allow users to reblock data globally or by data set name, volume serial, volume type and job name. The ARO will optionally adjust the number of buffers and DASD space requirements to match the new blocking factors.

Scheduled for release in March, the ARO will sell for $3,500.

Uccel Express Software, Box 1109, 360 Herndon Pkwy., Herndon, Va. 22070.

Application packages

Schonfeld & Associates, Inc. has ported its **Ingot** decision support system (DSS) modeling package to Tandem Computers, Inc. computers running the Guardian operating system Level B.10 or higher.

In addition to standard DSS capabilities, Ingot is said to include proprietary built-in models — ranging from automatic replacement value accounting to corporate credit risk — as English commands. Ingot has the ability to read and write files and share data with other programs. Applications of Ingot include time series forecasting, risk analysis, securities analysis and portfolio management.

Ingot is priced at $49,500 for a single Tandem TXP system and at $39,500 for a single Tandem EXT or Non-Stop II system.

Schonfeld & Associates, 2550 Crawford Ave., Evanston, Ill. 60201.

■

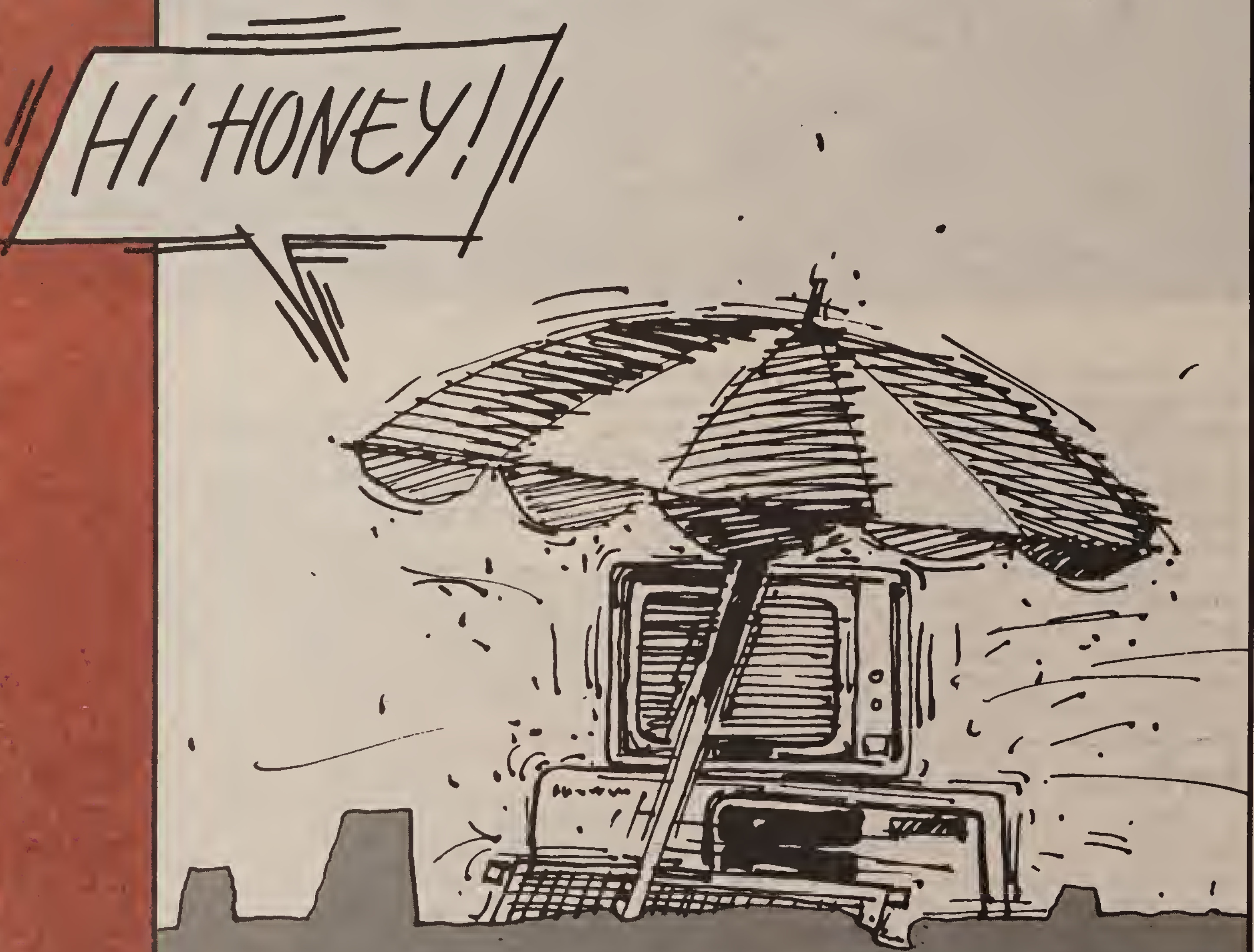
Sp-Stat, a statistical package that can compute descriptive, parametric, nonparametric, forecasting and probability statistics has bowed from **Softext Publishing Corp.**

The package can retrieve input from the user or from software formats like Ashton-Tate's Dbase II and III, plus standard delimited formats.

Sp-Stat can reportedly perform tests that include Z score, Crosstabs, Multiregression, ANOVA, HYPOMN, HYPOPO, Match T, Mann-Whitney, Wilcox, Spearman, Chi-Goodness, Chi-Indepen, Kolmogorov, Signtest and Time Series.

Sp-Stat lists for $295.

Softext Publishing, 17 E. 45th St., New York, N.Y. 10017.



HoneyBunch.
Honeywell VIP synchronous emulation and file transfer (FTF included).
Compatible with Topview and IBM PC Local Network.
Honeywell VIP asynchronous emulation and file transfer.
Compatible with Topview and IBM PC Local Network.
WriteMate option to download into Personal Assistant (PFS) file formats: 49 $.

Honeywell and VIP are trademarks of Honeywell Corp. IBM PC and Topview are trademarks of International Business Machines Corp. PFS is a trademark of Software Arts.

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TDT Inc., Rivergate Plaza, 444
Brickell Ave. Miami FLA 33131.
Tel. (305) 372.93.32

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For $400, you've always known what kind of extras to expect in a terminal.

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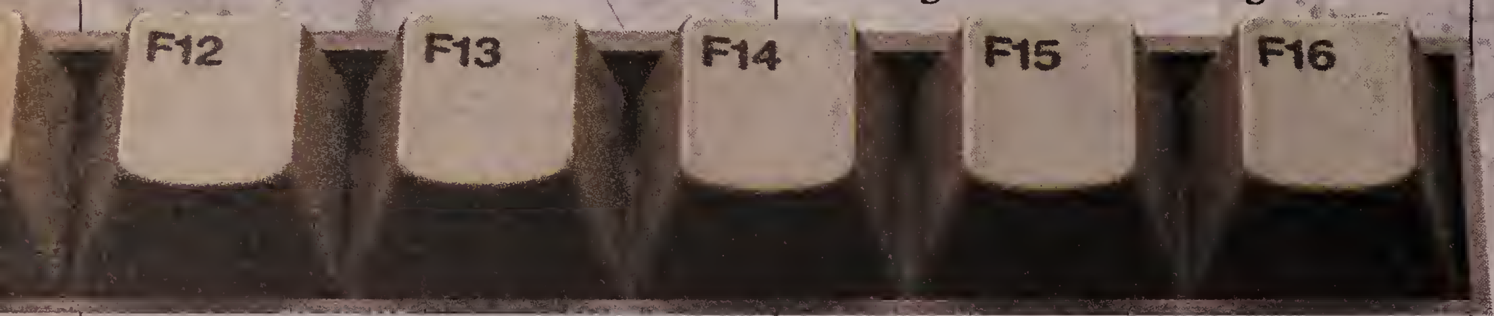
Introducing the TeleVideo® 905. High-end features at a low-end price.

Let's face it; despite most manufacturers' hype, you know what you get for $400. A basic core terminal, a few tacked-on bells and whistles, and not much more.

All that has changed with the new TeleVideo 905.



PROGRAMMABLE FUNCTION KEYS
16 special keys let you condense up to 32 sets of commands into simple, single keystrokes.

At $409, the TeleVideo 905 is the first of a new generation of "super terminals," offering an extended feature set so powerful you'd think you were sitting at an expensive workstation.

ENHANCED NUMERIC KEYPAD
This is the way people are used to entering numbers–quickly, smoothly, and with far less chance for errors.

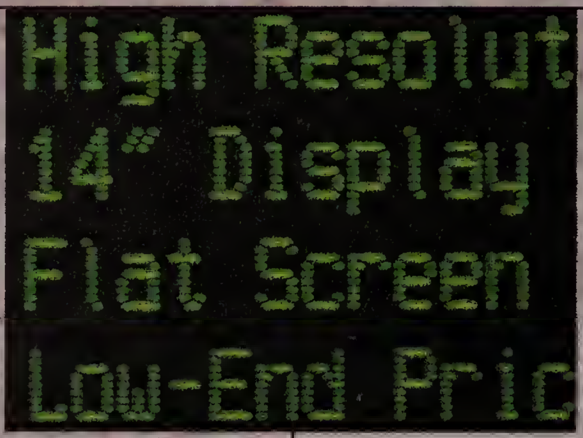
The following trademarks are acknowledged: ADDS Regent 25 and Viewpoint A2–Applied Digital Data Systems, Inc.; Lear Siegler–Lear Siegler, Inc.; WYSE–Wyse Technology; Hazeltine–Hazeltine Corporation; WordStar–MicroPro International Corporation.

Start with the 905's smooth, sleek design. The small footprint makes it a natural on any desk. The super-high contrast 14" flat screen offers the most readable image in the industry. And the screen tilts and swivels through a full 270° right and left, and from −5° to +15° up and down to reduce eyestrain, neck, and back problems.

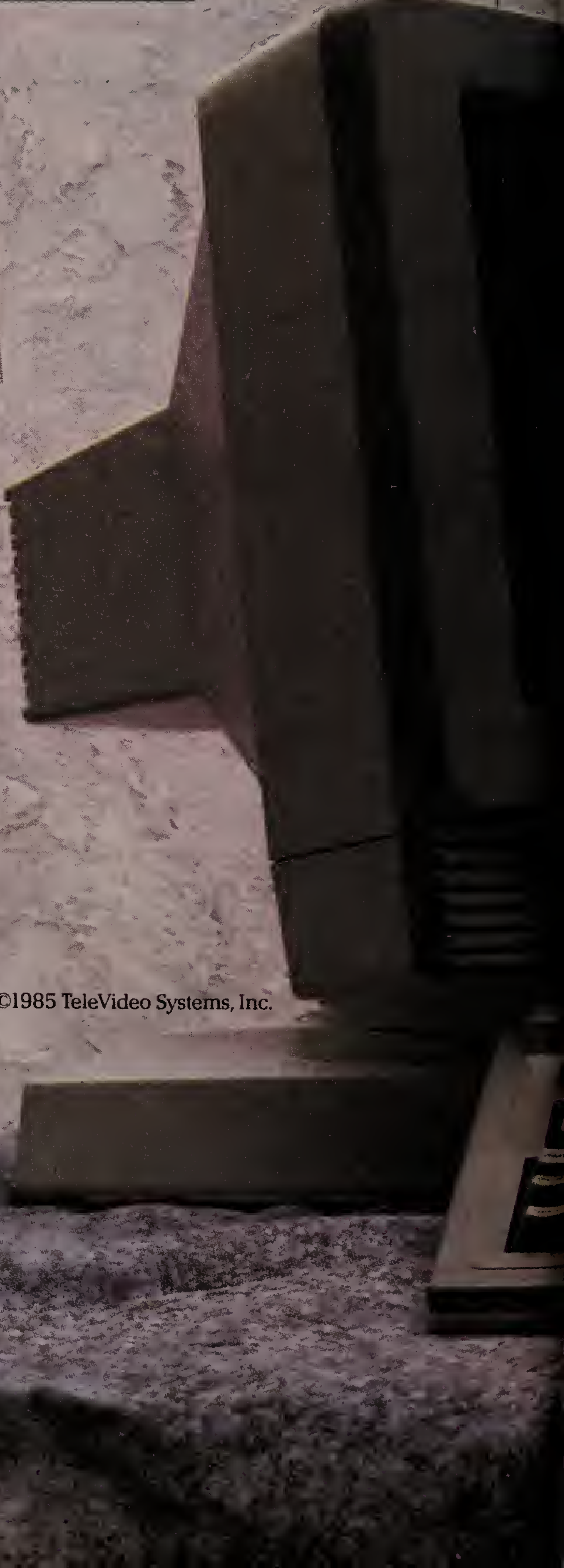
What the screen does for the eyes, the keyboard does for the fingers. New sculptured keycaps make for smooth, comfortable typing. Sixteen non-volatile, programmable function keys eliminate repetitive keystroking. And the keyswitches have been tested to 100,000,000 strokes, five times the rating of Wyse keyboards. About the only way to improve on our keyboard would be to add an enhanced numeric keypad.

Which we did.

This functional little terminal not only fits comfortably on any desk,



HIGH READABILITY SCREEN
The 14" super-high resolution flat screen has more than just contrast going for it. We also put more space between the characters for even better readability.



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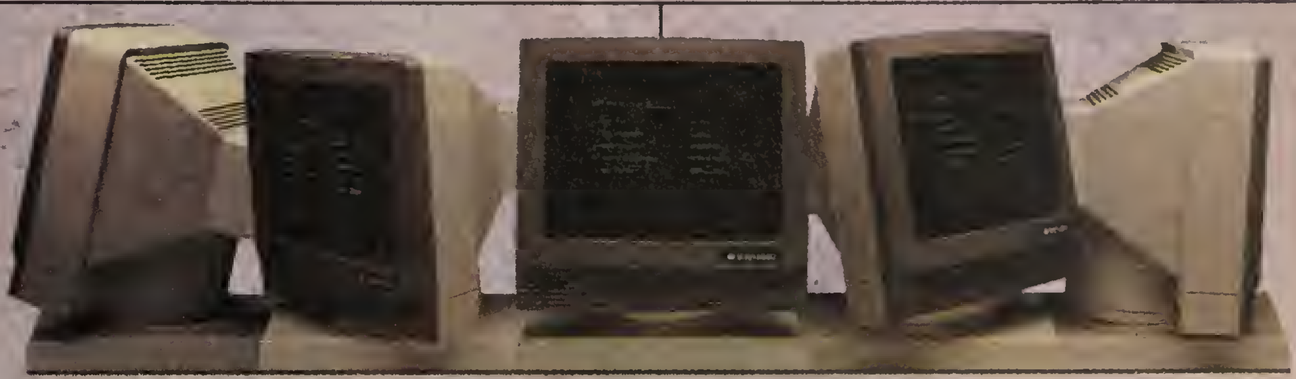
now.

it fits comfortably into most any system, too. That's because it's compatible with the TeleVideo 925 command set, the most popular and widely emulated ASCII command set in the world. In addition, you can make your terminal think it's an ADDS Regent 25.* Or a Viewpoint A2.* Or Hazeltine,™ or Lear Siegler.



FULL TILT AND SWIVEL *You can adjust the screen just about any way you want, right or left, up or down, for the maximum in user comfort.*

Or a TeleVideo 910 or 910+.

There's even a buffered printer port (standard), so your users don't have to sit around waiting for hard copy.

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TELEVIDEO 905 VS. WYSE WY-30		
FEATURES	TELEVIDEO 905	WYSE WY-30
ENHANCED NUMERIC KEYPAD	YES	NO
PROGRAMMABLE FUNCTION KEYS	16	4
TILT AND SWIVEL	YES	NO
HIGH CONTRAST DARK SCREEN	YES	NO
WORDSTAR® MODE	YES	NO

And now we're making it easy for you to get your hands on a terminal that's short on hype and long on performance.

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Data base management systems

National Information Systems, Inc. has released **Version 9** of its **Accent R** fourth-generation language and relational data base management system for Digital Equipment Corp. VAX processors running under VSM and Decsystem-10 and Decsystem-20.

Enhancements include a data clause for initializing values of temporary variables.

Prices range from $12,000 for the Microvax to $40,000 for VAX 8600 and Decsystem-10 and 20 processors.

National Information Systems, 20370 Town Center Lane, Cupertino, Calif. 95014.

Training

Software Express, Inc. has announced the **Appgen Development Tutorial**, designed to teach the use of its Appgen Development System.

The tutorial is a step-by-step process that is said to include software, documentation, sample data and on-line Help.

The Appgen tutorial runs on Unix and Microsoft Corp. Xenix systems.

Including software and manual, it costs $125. The manual alone costs $50, the vendor said.

Software Express, Seventh Floor, 2925 Briarpark Drive, Houston, Texas 77042.

■

American Training International, Inc. has announced **Teach Yourself Wordperfect** and **Teach Yourself Excel**, two two-disk interactive training programs.

Teach Yourself Wordperfect takes the user from the basic to complex word processing operations of Satellite Software International's Wordperfect, using sample letters to teach how to create, edit and change document formats.

Teach Yourself Excel offers instruction for Microsoft Corp.'s Excel on setting up a work sheet, entering data and formulas, preparing memos and graphs and integrating documents.

Each program costs $75.

American Training International, 12638 Beatrice St., Los Angeles, Calif. 90066.

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BEVM - open and close CICS files within or across **VSE/VM** machines from **BATCH.**
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BCAI - send and/or receive messages from batch jobs to/from any CICS terminal in full screen mode.
Bordelon BCAI Systems
Box 4618, Monroe, La 71211
318-255-5326

MICROS

Software

Software Systems Technology has announced **XDB**, a fourth-generation data base management system and applications generator.

XDB combines extended SQL with other modules including report writer, graph writer, forms manager, menu generator and command language.

It features a flexible import/export facility for transferring data that allows users to download existing data to or from other systems such as Ashton-Tate's Dbase II or III.

The XDB system runs on IBM PC-DOS or Microsoft Corp. MS-DOS.

The package is priced at $750, the vendor said.

Software Systems Technology, Suite 206, 7100 Baltimore Ave., College Park, Md. 20740.

Computer Corporation of America has announced **PC/Workshop** and has enhanced its **PC/204** micro-to-mainframe link.

PC/Workshop is an optional extension to Workshop/204, an application development environment.

Release 2 of PC/204 features the ability to upload files and download data, enhanced communications scripting and an inventory capability.

PC/Workshop requires an IBM Personal Computer with 256K bytes of memory running IBM PC-DOS or Microsoft Corp. MS-DOS and Computer Corporation of America's Model 204 data base management system running Workshop/204 under OS, DOS or VM. It is priced at $500 per personal computer. Release 2 of PC/204 costs $750 per personal computer.

Computer Corporation of America, 4 Cambridge Center, Cambridge, Mass. 01242.

There's a radical new direction in DBMS thinking. It's called INGRES. And it lets you put knowledge, not just raw data, into the hands of the end-user.

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Plus you'll have full use of the SQL and QUEL database languages. All of which means people who need information get it easily. In the shape that's most useful.

NEW PRODUCTS/MICROCOMPUTERS

Lattice, Inc. has announced **Secretdisk**, a data encryption system for IBM Personal Computers, Personal Computer XTs, ATs and compatibles.

Secretdisk uses the National Bureau of Standards' Data Encryption Standard to encrypt files on floppy or hard disks. It is loaded as a disk driver by Microsoft Corp. MS-DOS and creates MS-DOS drives where all data is encrypted.

Secretdisk costs $59.95.

Lattice, P.O. Box 3072, Glen Ellyn, Ill. 60148.

■

Imagimedia Technologies, Inc. has introduced **Super Microcad**, an enhanced version of its Microcad integrated two- and three-dimensional design, modeling and drafting system.

Super Microcad shows top, bottom and side views at once and allows users to work on any of them directly.

Plan and elevation views are also supported. The program is said to be compatible with the IBM Enhanced Graphics Adapter, the Professional Display Adapter and all other peripherals having video display interface drivers.

Super Microcad is priced at $1,500.

Imagimedia Technologies, P.O. Box 210308, San Francisco, Calif. 94121.

■

Odin Research has announced that its **Otis** decision support software is now available for the IBM Personal Computer family and compatibles.

Otis software also runs on all mainframe systems using the CMS operating system. The same source code is used for both. Otis is a decision support command language designed to manage time series data for analysis and forecasting. Otis costs $995.

Odin Research, 834 Old State Road, Berwyn, Pa. 19312.

■

Touch Technologies, Inc. has released **Version 2** of its **PC Menu** software program for the IBM Personal Computer XT and AT.

Version 2 offers password protection for any and all menu items.

It employs a one-way encryption algorithm. Highly sensitive topics or menu items may be made invisible to users who do not need to know they exist.

PC Menu Version 2 is priced at $139.95.

Touch Technologies, Suite 101, 609 S. Escondido Blvd., Escondido, Calif. 92025.

■

SMI Enterprises Corp. has announced **Lighthouse**, a graphics financial analysis software package for the IBM Personal Computer, Personal Computer XT and AT.

Lighthouse integrates three-dimensional graphics techniques, presentation-quality graphics and financial analysis. It provides break-even analysis, 24 management ratios and comparative financial statements. The program allows users to compare current position against, perform 12-month trend analysis and show a 10-year history, all in graphics format.

Lighthouse requires IBM PC-DOS 2.1 or higher, an IBM color graphics card and a color monitor. It is priced at $495.

SMI Enterprises, P.O. Box 582221, Tulsa, Okla. 74158.

■

Personal Computer Products has announced **Nocolor**, a software program for the IBM Personal Computer, Personal Computer XT, AT and compatibles.

Nocolor is intended for use on a system that has a color graphics board installed and a composite monitor. Nocolor is said to allow users to see clearer images on the composite monitor and to adjust background colors. The user can toggle between black and white and color modes.

Nocolor is priced at $19.95.

Personal Computer Products, B130, 3080 Olcott St., Santa Clara, Calif. 95054.

What's more, INGRES lets users share data and applications across different operating environments. Including IBM VM/CMS, DEC VAX/VMS and the UNIX operating systems. You can even access your database from your IBM PC.

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NEW PRODUCTS/MICROCOMPUTERS

Handle Technologies, Inc. has announced **Handle Draw**, the integrated graphics package of its Unix-based office automation software for the AT&T Unix PC.

Handle Draw is mouse driven with pop-up menus. It uses the Unix PC's User Agent environment to insulate the user from the operating system. It has a total of 2,304 cells displayed on screen, each with individual edit capability, allowing a user to edit 1/2,304 of the total picture at a time.

Handle Draw is priced at $199.

Handle Technologies, Suite 900, 7500 San Felipe, Houston, Texas 77063.

■

Control-C Software, Inc. has released **Starbeam**, a software program that prints existing Micropro International Corp. Wordstar document files on the Canon, Inc. LBP-8A1 laser beam printer.

Starbeam supports all relevant Wordstar commands. Starbeam's features, controlled by extensions to existing Wordstar commands, give users access to the typographic and paper-handling features in the Canon laser beam printer.

Starbeam is priced at $200.

Control-C, 6441 S.W. Canyon Center, Portland, Ore. 97221.

■

Elite Software Development, Inc. has announced **Best Friend**, a software utility for IBM PC-DOS.

Best Friend is said to reduce utility chores such as copying and deleting files and making and removing subdirectories into single keystroke operations. The program also includes productivity tools such as a calculator.

Best Friend will operate on any IBM Personal Computer, Personal Computer XT, AT or compatibles with PC-DOS 2 or higher. It costs $84.95.

Elite Software, P.O. Drawer 1194, Bryan, Texas 77806.

■

Sensible Software, Inc. has announced **Sensible Grammar**, a proofreading software package for the Apple Computer, Inc. Apple II computer.

Sensible Grammar checks the spelling of individual words as well as identifies commonly misused English phrases. It is compatible with the Applemouse and features an Apple Macintosh-style user interface with windows, pull-down menus, scroll bars and dialogue boxes.

Sensible Grammar requires a 128K-byte Apple IIe or IIc with 80-col. display. It costs $99.95.

Sensible Software, Suite 29, 210 S. Woodward, Birmingham, Mich. 48011.

■

Kepner-Tregoe, Inc. has added **Planning Pro**, a planning and brainstorming software program, to its Pro Counsel software series.

Planning Pro is said to act as a personal consultant to managers creating and implementing any kind of plan. It uses a breakdown approach to solve problems.

Planning Pro runs on IBM Personal Computers and compatibles, the Hewlett-Packard Co. 150 and the Digital Equipment Corp. Rainbow. It requires two disk drives, 256K bytes of memory and IBM PC-DOS or Microsoft Corp. MS-DOS 2.1 or higher.

It costs $350.

Kepner-Tregoe, P.O. Box 704, 17 Research Road, Princeton, N.J. 08542.

■

Chattahoochee Computer Products, Inc. has announced **Pounce**, a Cobol-oriented data base management system for the IBM Personal Computer and PC Network.

Pounce is said to provide high-speed interactive search, sort and update facilities for both indexed and direct files. Each data base may contain up to 65,000 fixed-length records of up to 4,096 bytes. As many as 32 search keys may be defined for each data base.

A single-user Pounce development system is priced at $495, according to the vendor.

Chattahoochee Computer Products, Suite 125, 2872 Woodcock Blvd., Atlanta, Ga. 30341.

■

Grolier Electronic Publishing, Inc. announced the **Electronic Encyclopedia,** a combination package that includes the compact disk read-only memory (CD-ROM) version of Grolier's Academic American Encyclopedia and a Philips Information Systems, Inc.'s CD-ROM disk drive.

Using the CD-ROM system, users have the ability to browse the encyclopedia, search by article titles and search the entire electronic text for words, groups of words or concepts in context using the electronic index.

The package runs on IBM Personal Computers or compatibles with 256K bytes of memory. It costs $1,495.

Grolier Electronic Publishing, 95 Madison Ave., New York, N.Y. 10016.

■

The Finot Group has introduced **Keeptrack Plus**, a hard-disk utility for IBM Personal Computers said to offer fast and usable backup.

Keeptrack Plus is an enhanced version of Keeptrack. Features include the Backup and Restore functions. Keeptrack Plus is said to make backup diskettes that have an identical file and directory structure as the hard disk. Other features of Keeptrack Plus are branch operations that allow the user to perform functions such as copy, move and delete on an

Continued on page 77

IBM 3270 and System 34/36/38 Users:

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For more information on the Interface Systems alternative, call **1-800-544-4072**. (In Michigan, 313/769-5900.) Or write to Interface Systems, Inc.,
5855 Interface Drive,
Ann Arbor, Michigan 48103,
Telex #810-223-6058.

Interface Systems, Inc.

The Right Printers for the Right Computer Systems

Continued from page 76

entire subdirectory.

Keeptrack Plus is priced at $79 plus $5 for shipping and handling.

The Finot Group, Suite 3, 2390 El Camino Real, Palo Alto, Calif. 94306.

■

Generic Software, Inc. has announced **Dot Plot**, software said to turn dot matrix printers into plotters.

Dot Plot works in conjunction with Generic Software's Generic CADD computer-aided design and drafting package. Any drawing that can be drawn by Generic CADD reportedly can be plotted on a dot matrix printer using Dot Plot. It can accommodate plots up to 14-in. wide at a resolution of 200 line/in.

Dot Plot costs $24.95. Generic CADD costs $99.95. Both run on IBM Personal Computers or compatibles.

Generic Software, Suite 203, No. 6 Lake Bellevue, Bellevue, Wash. 98005.

■

Brubaker Software, Inc. has released the **Baler Version 2**, an enhanced version of its Lotus Development Corp. 1-2-3 worksheet compiler.

Version 2 is said to support the 1-2-3 data base commands and functions in addition to the spreadsheet commands and functions supported in previous versions.

Version 2 can use IBM's Basic Compiler Version 2 or Microsoft Corp.'s Quickbasic Compiler. The Baler works with these compilers to convert a 1-2-3 work sheet file into a stand-alone program. The Baler operates on the IBM Personal Computer and compatibles. It costs $495.

Brubaker Software, Box 511, 116 West Main St., Delphi, Ind. 46923.

■

Graphware, Inc. has announced **Charts Unlimited**, a graphics/text processing program for the IBM Personal Computer and compatibles.

Charts Unlimited is said to integrate graphics and text processing to allow creation, editing and printing of flowcharts, organization charts, floor plans, electrical diagrams, Gantt charts and forms.

The program provides a set of flowchart objects and shapes as well as arrows and math symbols. It can also import characters and numbers from external text files to the graphics worksheet.

Charts Unlimited is priced at $295.

Graphware, P.O. Box 373, Middletown, Ohio 45042.

■

Aims+Plus, Inc. has announced its **Information Management Level 2** data base management system (DBMS) for the Wang Laboratories, Inc.'s Professional Computer, the IBM Personal Computer XT, AT and the AT&T Personal Computer 6300.

Information Management Level 2 is upwardly compatible with Information Management Level 1. It is said to allow creation of files with up to 250 fields and 2,500 characters per record. Records from two files can be merged into one.

The DBMS costs $695.

Aims+Plus, Suite 200, 5000 E. Ben White Blvd., Austin, Texas 78741.

Symantec Corp. has released **Version 1.1** of its **Q&A** data base management system that understands English sentences and is integrated with a word processor.

Version 1.1 includes an expandable spelling checker complete with 80,000 words in its dictionary.

Q&A runs on an IBM Personal Computer with 512K bytes of random-access memory (RAM). It costs $299. Bundled with a 256K-byte RAM memory board, it costs $349.

Symantec, 10201 Torre Ave., Cupertino, Calif. 95014.

Communications

DTSS, Inc. has announced that **Datapass**, its micro communications product designed to connect IBM Personal Computers to Unix and Honeywell, Inc. GCOS operating systems is now available for use with IBM VM/CMS systems.

Datapass offers error-checked uploading and downloading of binary or ASCII files across public networks. Datapass on IBM VM/CMS costs $4,900. The cost for the micro diskette and documentation is $160.

DTSS, P.O. Box 70, Buck Road, Hanover, N.H. 03755.

■

Practical Peripherals, Inc. has introduced the **Practical Modem 1200**, a Hayes Microcomputer Products, Inc.-compatible half-card modem for IBM Personal Computers.

The Practical Modem 1200 supports pulse or Touch-Tone dialing in full- or half-duplex operation and will self-adjust to varying transmission speeds from zero to 300 and 1,200 bit/sec. The unit also comes with its own software set including Pop-Up Telecomm from Popular Programs, Inc. and the vendor's Practical Terminal Package. It costs $199.

Practical Peripherals, 31245 La Baya Drive, Westlake Village, Calif. 91362.

■

Racal-Vadic, Inc. has introduced **Communikits**, two bundled communications packages for IBM Personal Computers and compatibles and the Apple Computer, Inc. Macintosh.

Both packages provide communications software, free access to on-line information services and a computer-to-modem interface cable. The IBM Communikit includes George 2 software from Racal-Vadic. George 2

Continued on page 80

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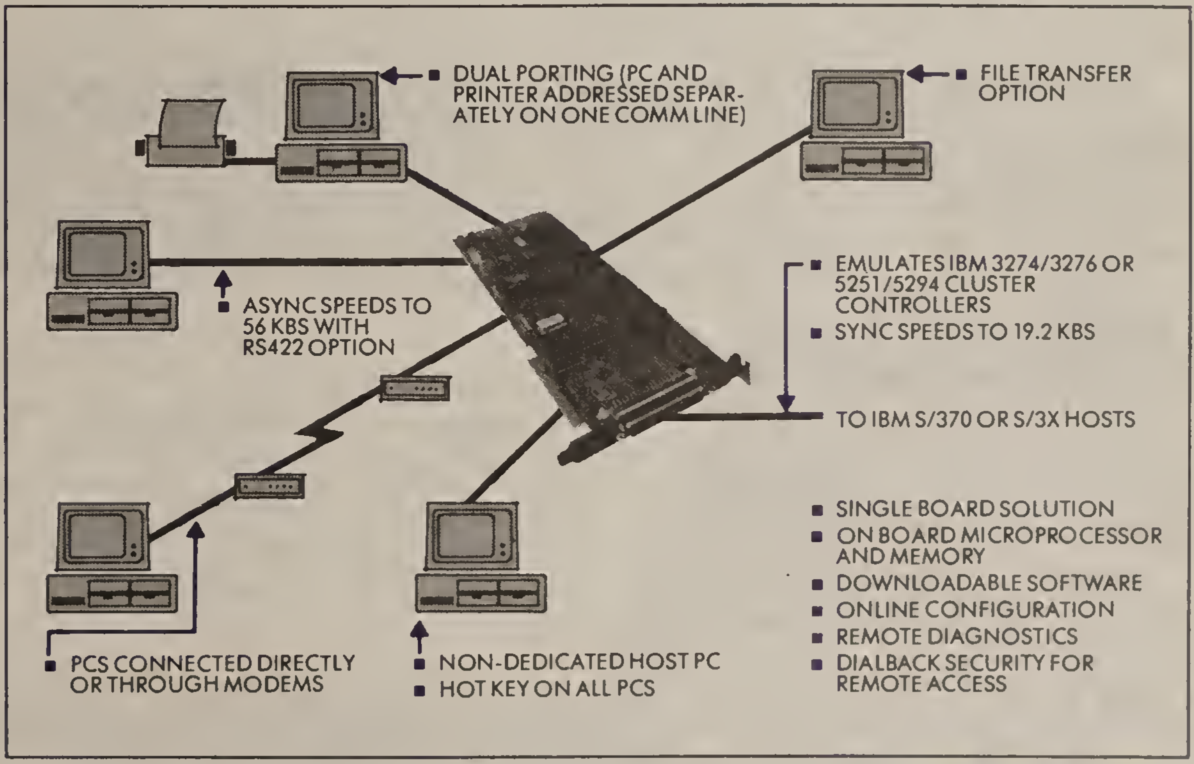
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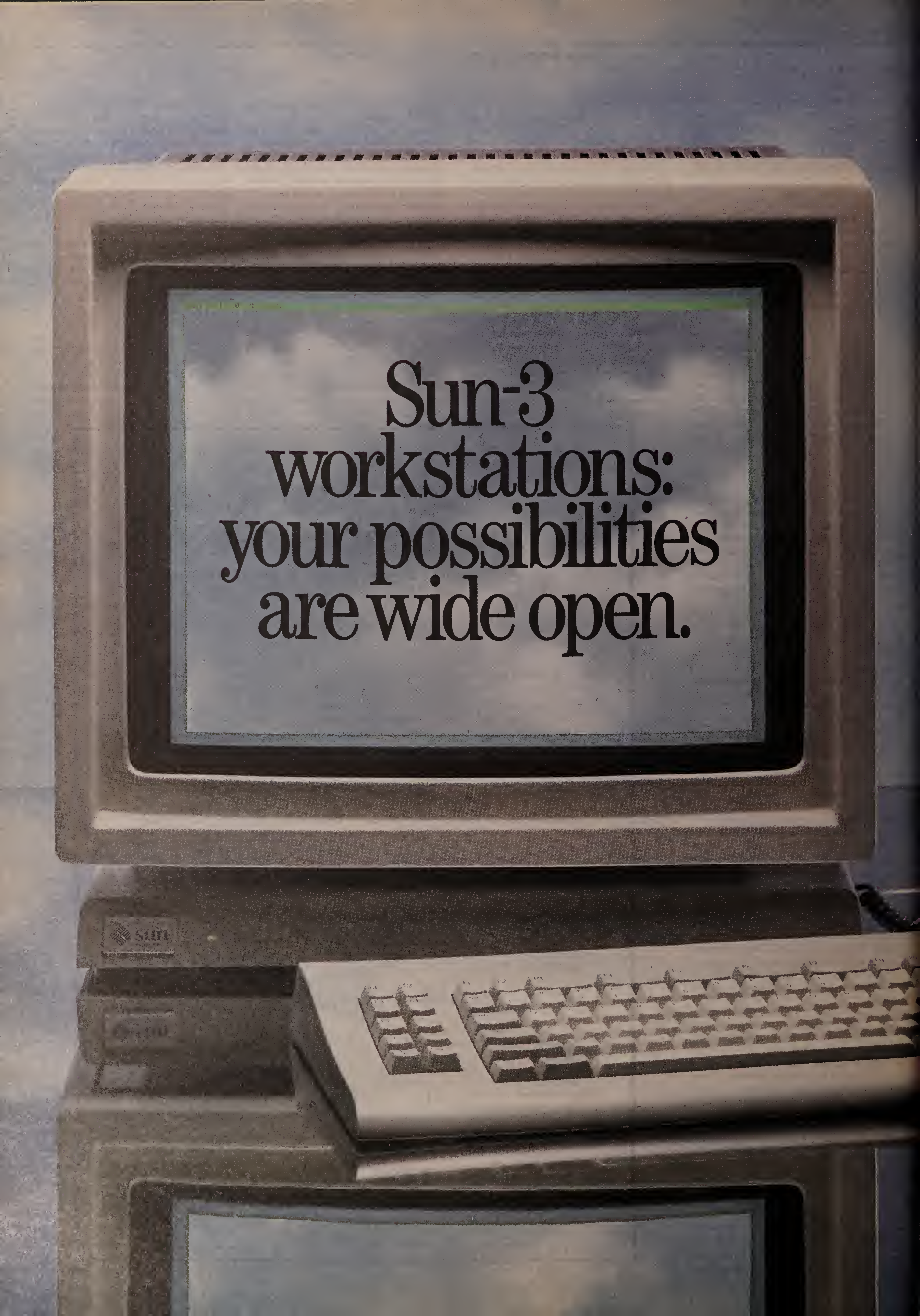
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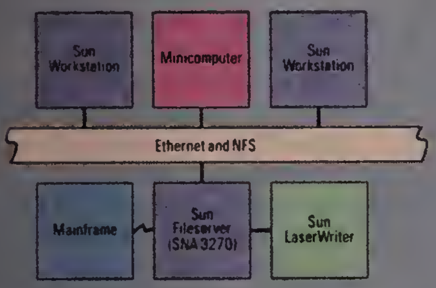
Sun's Open Advantage

Sun's open attitude recognizes that technology is moving too fast, in too many diverse directions to be effectively addressed by any one computer company. So, we elegantly integrated industry standards for hardware, software and data communications throughout every Sun Workstation® system to allow our customers to benefit from the diverse activities of every other open-minded company.



Multi-vendor Environment

Sun made this relationship particularly attractive to end-users and third-party developers by: revolutionizing UNIX* networking capabilities, greatly increasing the number of design tools in the already comprehensive UNIX toolchest, and, improving user interfaces to allow easier control of UNIX capabilities.

The resulting family of supermini-performance workstations, ranging from low cost diskless nodes to stand-alone workstations, has become the system of choice for anyone looking to capitalize on the burgeoning UNIX market.

And that's an open opportunity for you.

Open Opportunities

Sun's *Catalyst* third-party referral program presently boasts over 350 advanced products. Combined with the Sun-3's tremendous speed and enhanced capabilities, *Catalyst* products can open entirely new doors for your company into previously cost-prohibitive, computationally-intensive applications such as logic simulation, 3-D finite element analysis and knowledge-based systems.

Sun's Network File System (NFS) and SunLink™ products (SNA 3270 and BSC RJE IBM gateways, and Internetwork Router for linking remote Ethernets) assure that your engineering teams have access to all the computing resources they need. Mainframes. Minis. PCs.

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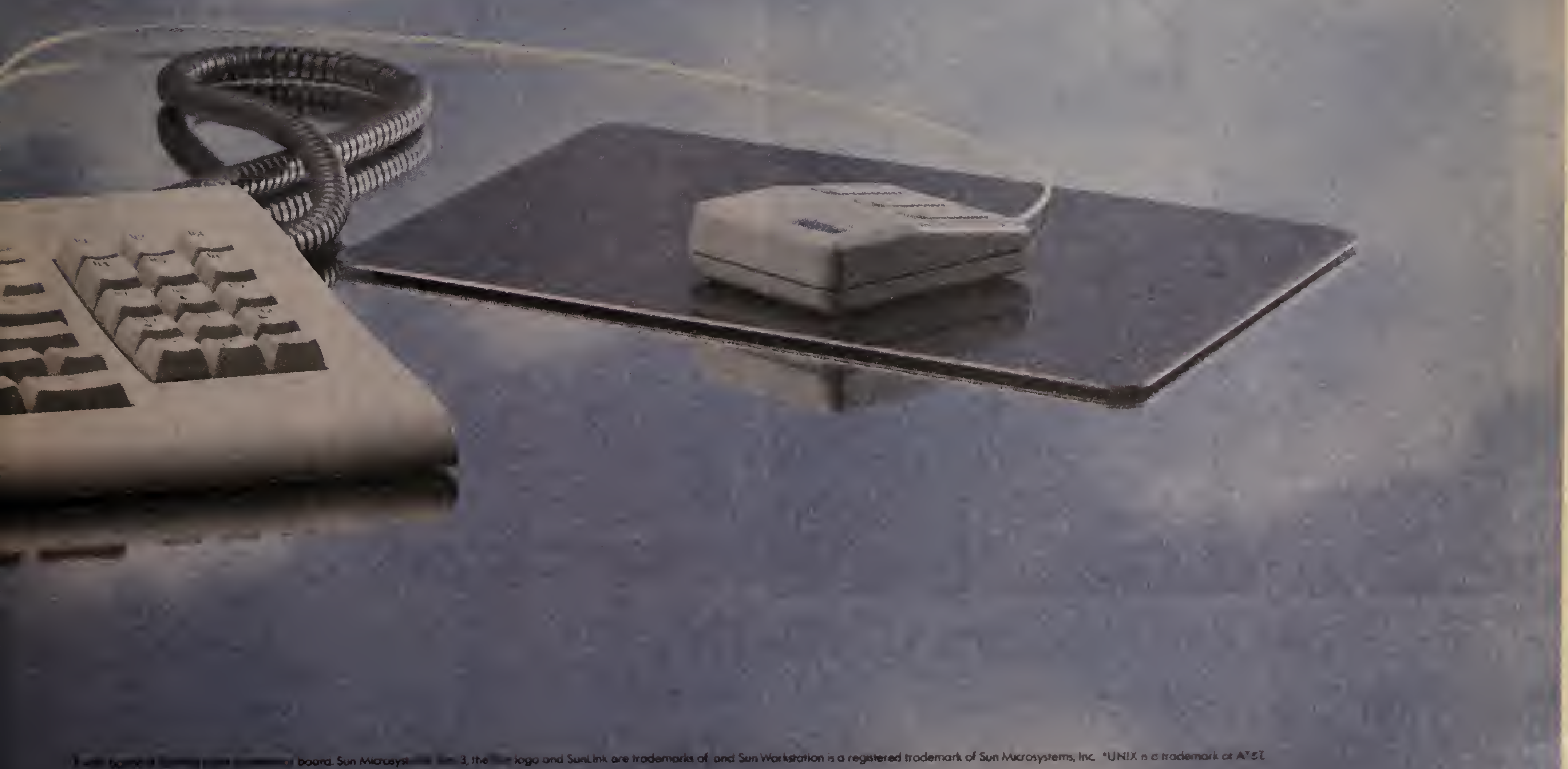

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Continued from page 77

allows operation at up to 9.6K bit/sec. and provides six terminal emulation modes and password protection.

The Macintosh Communikit includes MacGeorge software, featuring standard communications, an electronic mailbox and data base management capability.

Both Communikits cost $79.

Racal-Vadic, 1525 McCarthy Blvd., Milpitas, Calif. 95035.

Storage

Lodown has announced its **Tape Back-up** and **Hard Disk** for the Apple Computer, Inc. Macintosh Plus computer.

Lodown Tape Back-up can back up and restore Apple's Hard Disk 20, Lodown's Hard Disk and others. It comes in both 22M- and 60M-byte cartridge configurations. The Lodown Hard Disk offers storage capacities of 10M, 20M, 40M or 80M bytes per disk drive.

Up to eight Hard Disks and Tape Back-ups can be connected to one Macintosh Plus system.

Prices for the Hard Disk range from $795 to $3,995. The Tape Back-up with 22M bytes costs $895; with 60M bytes the price is $1,795.

Lodown, P.O. Box 5146, Pleasanton, Calif. 94566.

■

Maynard Electronics has announced the **Maynstream PCI 20**, an internally installed streaming tape backup system said to back up an average 10M-byte drive in 3 minutes onto a ⅛-in. data cassette.

The Maynstream PCI 20 has file-splitting capability, ensuring that even when one cassette is full, the backup can be continued on another. It offers automatic read-after-write checks to ensure the accuracy of backed-up data.

The Maynstream PCI 20 includes the controller interface card or module, data cassette, software and manual. It is priced at $1,195.

Maynard Electronics, 460 E. Semoran Blvd., Casselberry, Fla. 32707.

■

Maynard Electronics has introduced the **Sandstar Floppy/Hard Drive Controller Card** said to control two internal 5¼-in. floppy drives and two hard disk drives.

The card is IBM Personal Computer compatible and requires only one slot on the system board. It also has two modular areas that can be used to add a serial port, parallel port, clock calendar and game port.

The Sandstar Floppy/Hard Drive Controller Card is priced at $595. If purchased with the Maynstream tape backup module, the card is priced at $790.

Maynard Electronics, 460 E. Semoran Blvd., Casselberry, Fla. 32707.

Board-level devices

The **Intelligent Computer Users Group** has introduced **CP/EM**, Digital Research, Inc. CP/M 80 emulation for Microsoft Corp. MS-DOS, and the **Accelerator**, a CPU for the IBM Personal Computer and compatibles.

CP/EM allows MS-DOS redirection of I/O devices used to alter device assignments, allowing CP/M access to all standard MS-DOS devices.

The Accelerator is a pin-to-pin replacement of the Intel Corp. 8088 or 8086 CPU.

CP/EM costs $79.95, and the Accelerator costs $49.95, the vendor said.

Intelligent Computer Users Group, P.O. Box 10118, Rochester, N.Y. 14610.

■

Hexace Technologies, Inc. has introduced its **RAM expansion card**, said to expand the memory of the IBM Personal Computer and compatibles using 64K-byte or 256K-byte chips.

The RAM card fits into a short slot and can be expanded from 192K bytes to 576K bytes, for up to 640K bytes. It uses dynamic random-access memory capabilities.

The card costs $169.

Hexace Technologies, 271 N. Mathilda, Sunnyvale, Calif. 94086.

COMMUNICATIONS

Voice/data communications

Intecom, Inc. has introduced its **ITE 4** digital telephone.

The ITE 4 accommodates both desk and wall mountings. It is equipped with four feature buttons — hold,

Continued on page 81

Looking for a workstation tool with the power of RAMIS® II and the friendliness of a PC?

Martin Marietta Data Systems introduces UNISON,™ the first workstation tool to combine the ease of use of a PC with the mainframe power of RAMIS II – the most comprehensive, widely-used 4GL product ever created.

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Continued from page 80

transfer, call back and access — and can be adjusted to emit various ring tones. The faceplate exhibits an overlay detailing the product's fixed features, touch-pad features and instructions for Intemail, Intecom's voice messaging system.

The ITE 4 sets are priced at $98 each.

Intecom, 601 Intecom Drive, Allen, Texas 75002.

Protocol converters

Electrodata, Inc. has introduced the **ME 3 V.35 Modem Eliminator/Converter.**

The ME 3 is said to permit the direct connection of two terminals or computers without the need for modems.

Both RS-232 and CCITT V.35 interfaces are supported as well as interface conversion between RS-232 and V.35.

User-selectable options are set by external switches. The internal clock can be set to 19 crystal controlled rates between 14.4K bit/sec. and 896K bit/sec. or driven externally from the terminal or computer.

The ME 3 is priced at $475.

Electrodata, 23020 Miles Road, Bedford Heights, Ohio 44128.

Software

Touchstone Software Corp. has modified its **PC Works** software application to run under AT&T's PC/PBX Connection interface.

PC Works, part of the Connectable family of networking applications, provides personal computer-to-personal computer or personal computer-to-host services through a private branch exchange. It includes an electronic mail display and editor that is compatible with both Unix and VMS standards. The modified version is said to provide automatic connections through the AT&T System 75 and System 85 PBXs to any other application packages using the PC/PBX Connection interface or Electronic Industries Association interfaces.

PC Works costs $195.

Touchstone Software, 909 Electric Ave., Seal Beach, Calif. 90740.

Multiplexers/modems

Fibronics International, Inc. has enhanced its **Unimux 832** voice/data multiplexer.

The enhanced model supports RS-499 or CCITT V.35 at speeds up to 288K bit/sec. due to the availability of a high-speed channel card. Also available is a 1,300-nanometer option for the fiber-optic transceiver interface. The 1,300-nanometer option provides a 22db optical budget. A redundant power supply and optical transceiver option are also featured.

The Unimux 832 ranges in price from $3,500 to $15,000, depending on the number of channel cards installed. The channel cards are priced ranging from $500 to $1,800, depending on the configuration.

Fibronics, 325 Stevens St., Hyannis, Mass. 02601.

Local-area networks

Choice Retail Systems has introduced **Choice-Net**, a communications network designed to support point-of-sale registers, and **Retailer's Choice**, a series of software for inventory control and sales analysis.

Choice-Net configurations are available for controlling a single store, several stores in a region and several regional offices. Choice-Net users will be able to adopt point-of-sale technology as it becomes available without ever changing the communications network.

A Choice-Net system for in-store processing, complete with a basic set of Retailer's Choice applications, is priced at approximately $15,000.

Choice Retail Systems, 1345 Terrell Mill Road S.E., Marietta, Ga. 30067.

■

Concord Data Systems, Inc. has announced the **Mapserver/Plus TIM**, an integrated hardware/software product said to provide both high-speed General Motors Corp. Manufacturing Automation Protocol (MAP) connections and RS-232 terminal networking capabilities over broadband and carrier-band IEEE 802.4/MAP nets.

The Mapserver/Plus TIM is based on the vendor's four-port Token/Net Interface Module (TIM) hardware and is available for 5M bit/sec. and 10M bit/sec. broadband networks and 5M bit/sec.

Continued on page 84

Looking for an information center system that handles just about anything they throw at you?

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RAMIS II is the only product designed to support every level of user expertise. It offers a choice of a non-procedural language, easy-to-use menus and Artificial-Intelligence-based natural language processors for French or English.

What's more, with RAMIS II on the PC, you gain a stand-alone workstation or a seamless extension of your mainframe.

Now you can make end user computing effective in your company at last. With RAMIS II, another of Martin Marietta's Natural Selection™ products: an interrelated family of products that work with an extraordinary variety of machines, environments, applications needs and degree of user sophistication.

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NEW PRODUCTS/COMMUNICATIONS

Continued from page 81

carrier-band networks. It includes both MAP and terminal networking software.

Prices for the Mapserver/Plus TIM range from $4,500 to $5,854.

Concord Data Systems, 303 Bear Hill Road, Waltham, Mass. 02154.

Auxiliary equipment

Pacific Data Products has announced the **Distributed Data Switch**, said to connect mainframes, minicomputers, terminals, printers and personal computers.

The switch interconnects clusters of serial RS-232 and parallel devices. The coaxial link between switches is rated at 1.8M bit/sec. Networks in separate facilities can link together over standard telephone lines using the network bridge capability built in to each switch.

Switches are available in both baseband and broadband configurations. A minimum five-port configuration costs $900.

Pacific Data Products, Suite 1, 8545 Arjons Drive, San Diego, Calif. 92126.

SYSTEMS & PERIPHERALS

Data storage

EMC Corp. is offering the **HXP-3700 series** of memory cards for the Hewlett-Packard Co. HP 3000 Model 37 computer, said to use zip-packaged 256K-byte dynamic random-access memory.

Zip-packaged memory features a zigzag in-line pin design that allows chips to be packed more closely than conventional devices. The new cards also provide an on-line/off-line switch and activity indicator.

Prices are $18,000 for the 4M-byte HXP-3704, $9,000 for the 2M-byte HXP-3702 and $5,000 for the 1M-byte HXP-3701.

EMC, Natick Industrial Center, 12 Mercer Road, Natick, Mass. 01760.

Terminals

Link Technologies, Inc. has introduced the **Link 220** Digital Equipment Corp. VT220-compatible VDT.

The terminal features a 14-in. green or amber display, two bidirectional communications ports, block mode, eight hidden video attributes in any combination, eight resident character sets with four downloadable sets available and two pages of standard memory. It is also VT100, VT52 and ANSI 3.64 compatible. The keyboard is DEC VT220 style but includes 38 progammable function keys.

Link 220 costs $595.

Link Technologies, 2260 Paragon Drive, San Jose, Calif. 95131.

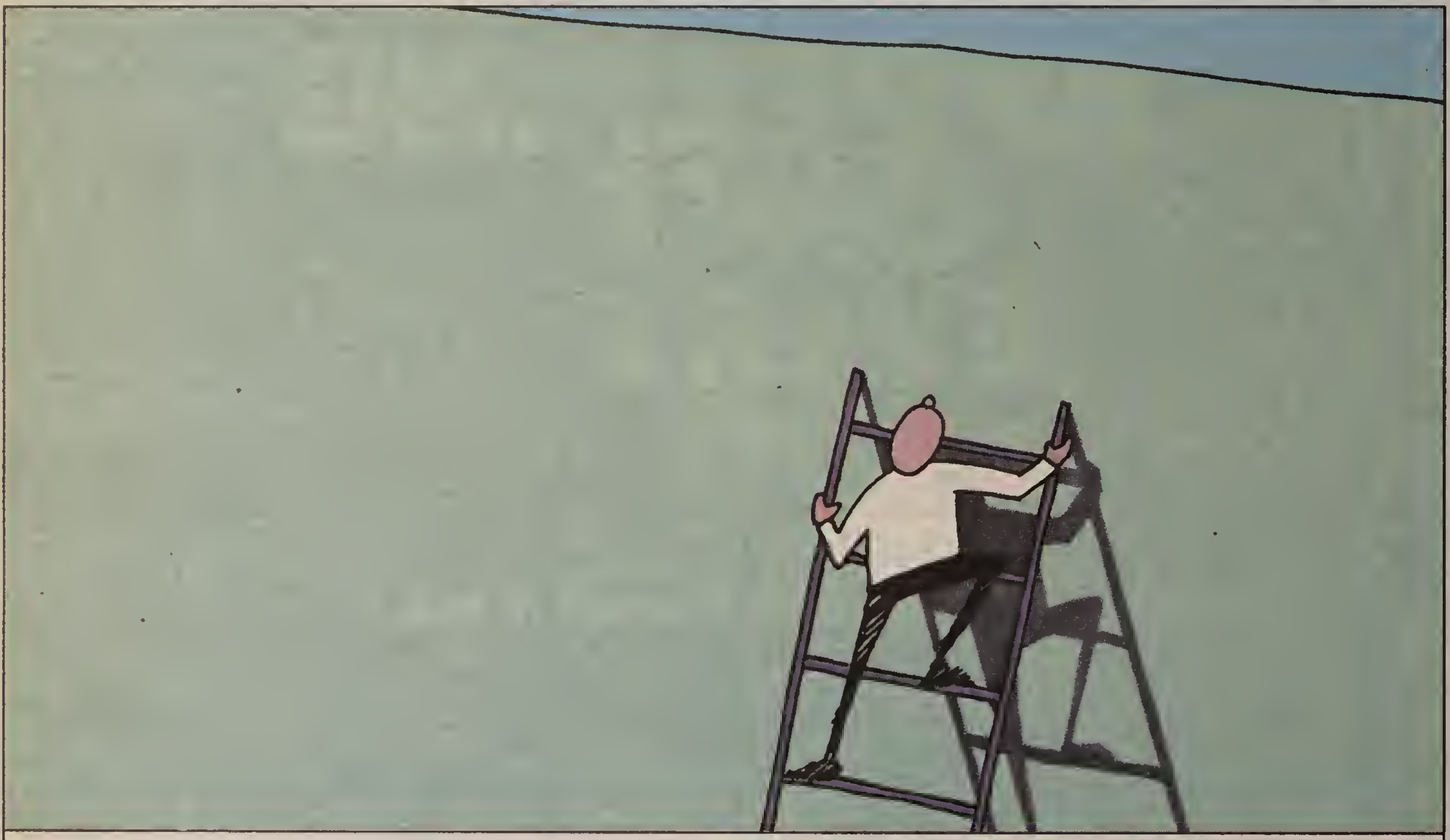
■

Carroll Touch has added the **Electrohome 38G19403** model and the **Hantarex CT900** series open-frame monitors to its Add-Touch product line.

The additions are scanning infrared touch input systems designed for 13-in. monitor products.

Systems for both models are priced at $670.

Carroll Touch, P.O. Box 1309, Round Rock, Texas 78680.



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Now, for instance, you can write in just ten to twenty pages of 4GL code, applications that would take hundreds of pages with C.

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For more information and our free booklet, "A 20-Minute Guide to INFORMIX-4GL," call 415/322-4100.

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The system works with the industry's most-preferred networking modems from Codex, and includes a raft of other features to make your network more effective. You have greater operational control, improve your cost efficiency, and ensure optimum network uptime.

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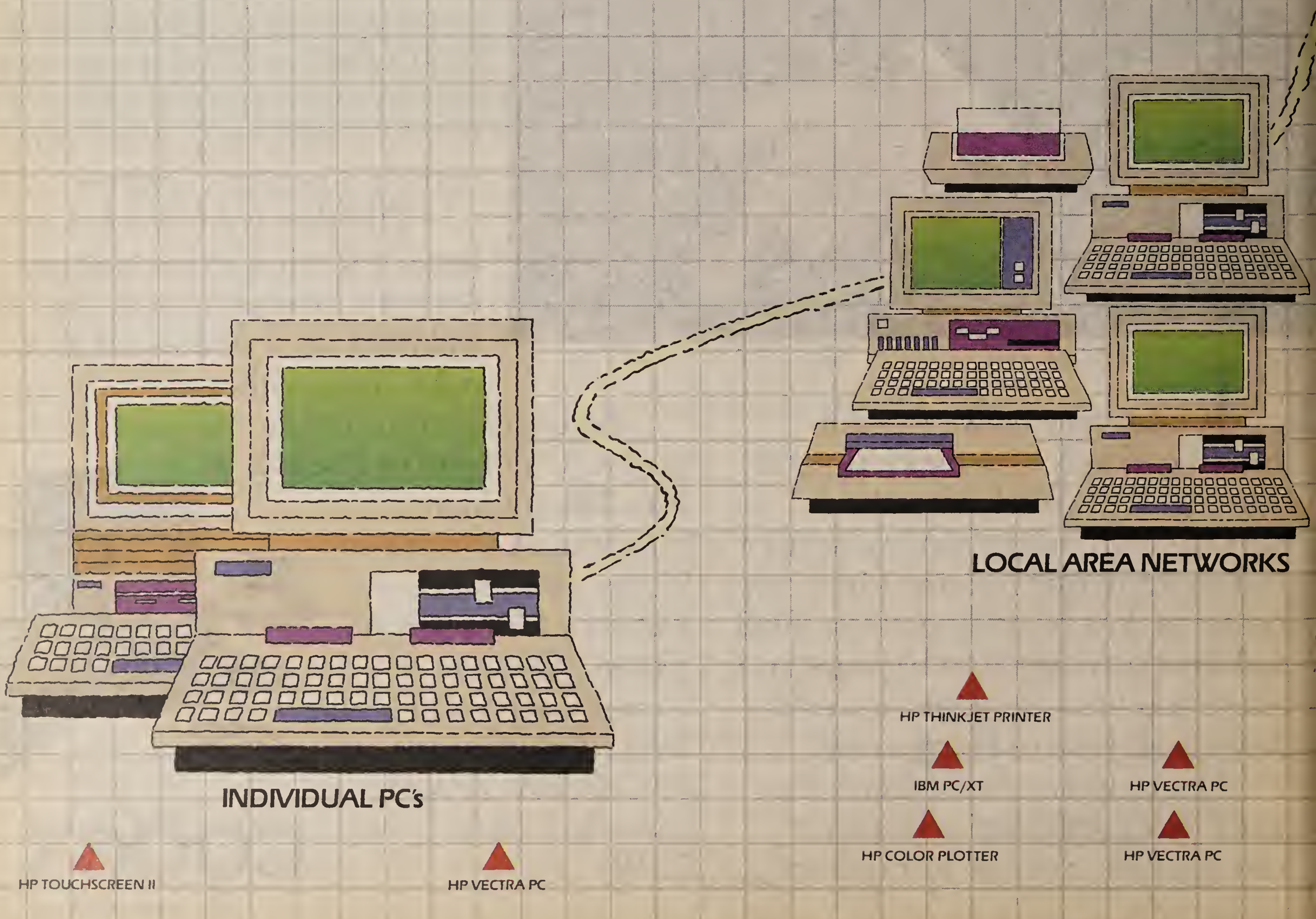

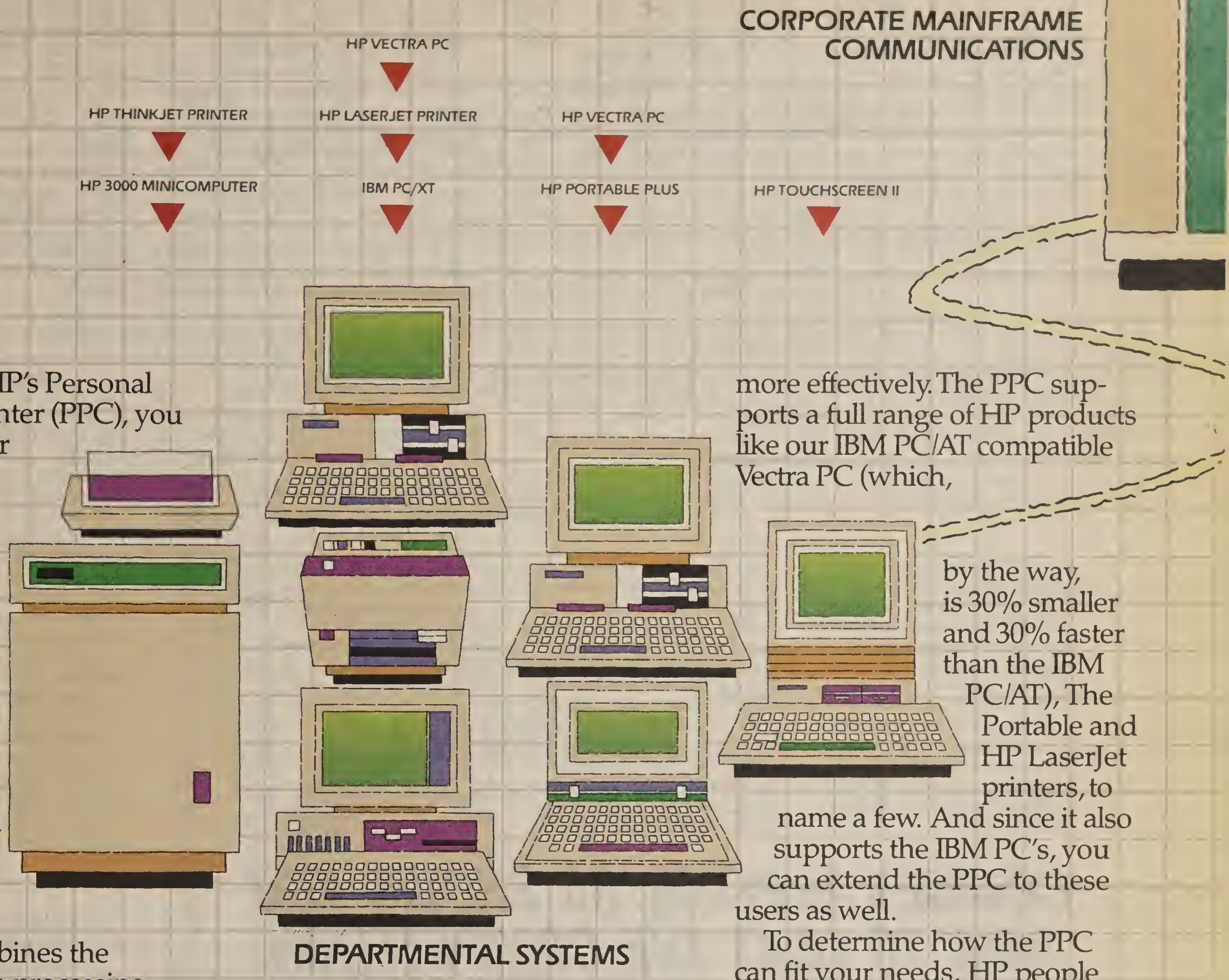

In fact, with HP's Personal Productivity Center (PPC), you can start small or big and create a compatible office information system. A system that lets you manage growth easily. A system that can change as you change, grow as you grow.

The PPC combines the strengths of data processing and personal computing. So individuals, work groups, departments or entire corporations can access, share and exchange information better.

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For instance, a PPC can be just a few PC's, a local area network, a departmental system based around an HP 3000 minicomputer or a company-wide information network that ties together *multiple* PPC's. Where you go from there is up to you. It's that flexible.

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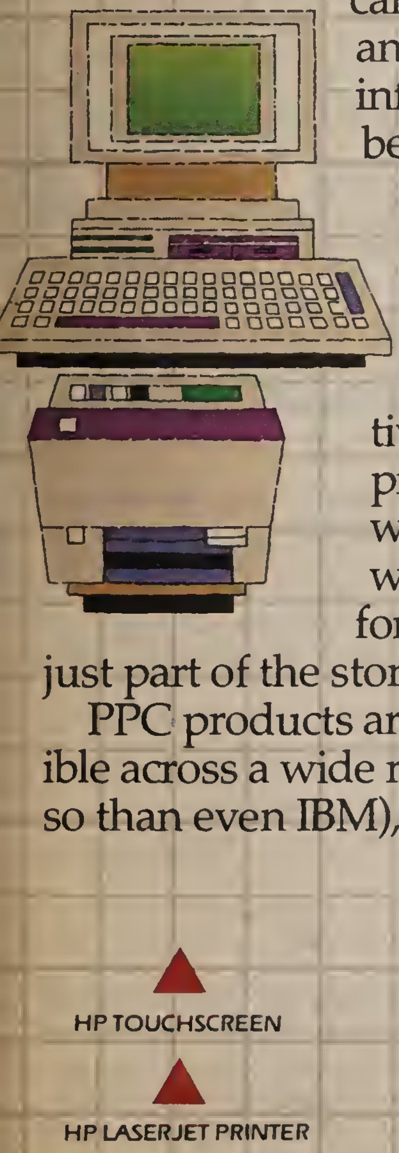

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Business Computing Systems

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Ann Arbor Terminals, Inc. has added the **DC1150** to its line of DC1000 display controllers.

The DC1150 converts serial RS-232 data to composite video for display on commercial video monitors at speeds ranging from 110 bit/sec. to 19.2K bit/sec. without pad characters.

The controller provides two display formats: 16 lines by 32 col. or 8 lines by 32 col., according to the vendor.

Other selectable parameters include transfer rate, scroll and uppercase/lowercase display. The unit also features visual attributes including dim, bold, blink and reverse video characters.

The DC1150 is priced at $695, the vendor said.

Ann Arbor Terminals, 6175 Jackson Road, Ann Arbor, Mich. 48103.

Printers/plotters

Adage, Inc. has introduced the **Adage Series 6000 Ink Jet Color Hardcopy System** for Digital Equipment Corp. and IBM graphics users.

The system interfaces to all Series 6000 workstations via red-green-blue connections and supports multiple users. Features include a video interface unit.

Each Ink Jet Color Hardcopy System supports up to four workstations. Paper and transparency output are both supported.

The system includes the 6000 Ink Jet Printer, 6000 Video Interface and 6000 Video Multiplexer. A configuration capable of supporting four Adage Workstations costs about $5,500 per workstation.

Adage, One Fortune Drive, Billerica, Mass. 01821.

Data Recording Systems, Inc. has introduced the **Laserscribe/1000** printer and the **Pagestore** dual-disk image storage subsystem.

The Laserscribe/1000 is a plain paper, typographic-quality laser printer that images at one million dot/sq in. It offers software-selectable dual-speed and dual-resolution printing.

The Pagestore subsystem allows users of both the Laserscribe/8415 and the Laserscribe/1000 printers to remove the requirement that the output data rate of a raster image processor never be less than the data rate of the printer.

The Laserscribe/1000 costs $30,000, and the Pagestore costs $10,000. Both are being marketed to OEMs and will be available in April.

Data Recording Systems, 80 Ruland Road, Melville, N.Y. 11747.

Roland DG has introduced the **DPX-2000** X-Y plotter said to feature professional drafting specifications.

The DPX-2000 is an eight-pen plotter that offers serial and parallel interfaces, the ability to handle various paper sizes, 16 in./sec. plotting speed, automatic pen capping, electrostatic paper hold down, autosensor for pen type, multispeed digitizer and a 3K-byte buffer.

The DPX-2000 plotter is priced at $4,795.

Roland DG, 7200 Dominion Circle, Los Angeles, Calif. 90040.

Graphics systems

Nicolet Computer Graphics Division has announced **Zetavue**, a color graphics slide production system that is compatible with any computer supporting RS-232 or IBM's 3270 IDSS protocol.

The system can convert graphics programs into 35mm graphics slides at a rate of one per minute. The system is said to accept graphics information in Hewlett-Packard Co.'s Graphics Language — as well as other graphics languages — from any computer over an RS-232 line or via coaxial cable from an IBM 3274 or 3276 cluster controller.

Priced from $7,395, Zetavue is a rasterizing computer system containing 512K bytes of memory, expandable to 1M byte.

Nicolet Computer Graphics, 777 Arnold Drive, Martinez, Calif. 94553.

■

Dunn Instruments has announced three **Multicolor** film recorders.

The ultra-high line rate Multicolor offers direct screen compatibility with flicker-free graphics terminals and workstations such as the IBM 5080 and Sun Microsystems, Inc. 3/160C. It offers 10 optional film backs, on-line diagnostics and remote RS-232C interface.

The other two Multicolors are the standard and high line rate versions. All three have a view port for viewing the image before shooting.

Prices for the three Multicolors range from $5,000 to $8,500.

Dunn Instruments, 544 Second St., San Francisco, Calif. 94107.

■

Interactive Machines, Inc. has announced the **IMI-600** solid modeling stroke system for computer image generation.

Specifications of the IMI-600 reportedly include 500 polygons at 60 MHz; 4K-byte by 4K-byte by 24-bit color area fill; 60Hz refresh and 60Hz update; and integral 24-, 32-, and 64-bit floating-point applications accelerator.

Prices for the IMI-600 computer image generation system start at $80,000.

Interactive Machines, 733 Lakefield Road, Westlake Village, Calif. 91361.

■

Tektronix, Inc. has announced the **Option 19 Color Copier Interface** for the 4120 Series Color Graphics Workstations said to enhance the color output of Tektronix 4690 Series Color Graphics Copiers.

The Option 19 increases the Tektronix 4690 copiers' color palette to

Continued on page 90

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NEW PRODUCTS/SYSTEMS & PERIPHERALS

Continued from page 88

more than 1,000 times the shades previously available, enabling the hard-copy output to be closer to the colors of the on-screen display.

The Option 19 Color Copier Interface costs $1,100. Owners of earlier versions of Option 19 can order the Option 19 Upgrade Kit for $200.

Tektronix, P.O. Box 500, Beaverton, Ore. 97077.

Power supplies

RAM Technologies has announced the **PC-200** uninterruptible power supply for personal computers.

Panel controls and indicator include a master power/reset switch and alarm reset. The two-color LED is green for normal operation, flashes red when ac power is lost and flashes green when power is restored.

Two models are available: 117V and 220V. Each provides 2.5A input current, input protection via a 3A line fuse and transient suppressor and output protection via a 20A fuse.

The PC-200 costs $365 in quantities of one to five.

RAM Technologies, 690 West 28th St., Hialeah, Fla. 33010.

Board-level devices

BUS-65502, a dual-redundant MIL-STD-1553 bus controller, remote terminal unit and bus monitor with a VMEbus interface, is available from **ILC Data Device Corp.**

The unit is packaged on a standard 6.3- by 9.2-in. VME Eurocard. It provides an intelligent bus controller, remote terminal unit and bus monitor interface between a 1553 serial multiplexer data bus and parallel VMEbus.

The unit supports all message formats, implements 12 mode codes and provides built-in dynamic wraparound test capability, according to the vendor.

The unit costs $6,695.

ILC Data Device, 105 Wilbur Place, Bohemia, N.Y. 11716.

Auxiliary equipment

Compudyne, Inc. is offering the **Environmental Monitoring System-400** (EMS-400) designed to phone programmed telephone numbers and alert the listener of undesirable or dangerous conditions in a computer room.

According to the vendor, if temperatures have exceeded desired limits, if electrical power fails or if there is a sharp increase in sound level for more than 10 sec., EMS-400 calls and identifies itself and the condition in a synthesized voice. Users can call the unit at any time and receive reports including time, temperature, battery condition and power status.

The EMS-400 for computer rooms is priced at $500.

Compudyne, 10 DeAngelo Drive, Bedford, Mass. 01730.

PRICE REDUCTIONS

Borland International has bundled its **Sidekick** for the Apple Computer, Inc. Macintosh with a **Phonelink** accessory that enables Sidekick users to dial out without the use of a modem.

The bundled price is $99.95. Borland has also cut the price of Phonelink, sold separately, to $19.95.

Borland International, 4585 Scotts Valley Drive, Scotts Valley, Calif. 95066.

■

Inmagic, Inc. has announced a multiple-copy discount schedule and a corporate license policy for its **Inmagic** software package.

The microcomputer version of Inmagic is priced at $975. For two through 10 copies, the price is $510 each. The corporate license schedule is as follows: 25 copies, $8,750; 50 copies, $15,000; and 100 copies, $25,000.

Inmagic, 238 Broadway, Cambridge, Mass. 02139.

■

Control Data Corp. has announced a **site licensing policy** designed for nonprofit higher education institutions using its Plato college-level educational software.

According to the vendor, the new policy allows users of the IBM Personal Computer versions of the Lower Division Education Curriculum to reproduce the software in any quantity for an annual fee of $1,950 per course.

Plato courses also require a student package including computer disks and documentation.

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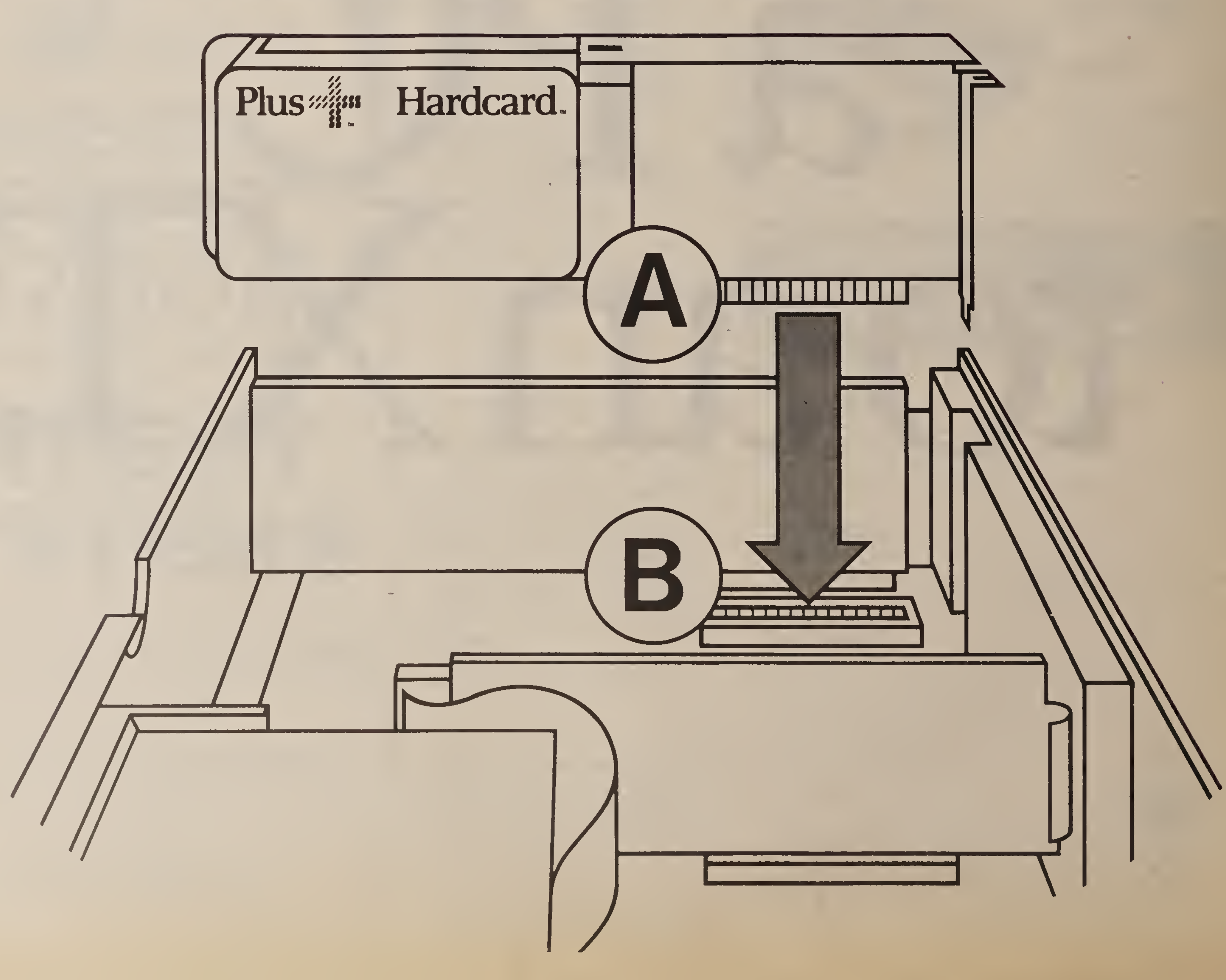

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CALENDAR

WEEK OF FEB. 9

FEBRUARY 9-12, ATLANTA — **SAS Users Group International's Eleventh Annual Conference — SUGI 11.** Contact: SUGI Coordinator, SAS Institute, Inc., Box 8000, SAS Circle, Cary, N.C. 27511.

FEBRUARY 9-12, ORLANDO, FLA. — **American Bankers Association's 1986 Telecommunications and Financial Networks and Video Banking III Conferences.** Contact: Linda Gustavson, ABA Operations Group, 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

FEBRUARY 9-13, PALM SPRINGS, CALIF. — **Third Annual Electronic Printing Systems Conference.** Contact: Dunn Technology, Inc., Suite 1, 1855 E. Vista Way, Vista, Calif. 92084.

FEBRUARY 10-11, CONCORD, CALIF. — **Principles of Prototyping.** Contact: Thomas J. Bisacquino, Director of Education, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

FEBRUARY 10-11, NEW YORK — **Intro to Lotus — Advanced Lotus.** Contact: Center for Advanced Data Processing, Suite 402, 450 Seventh Ave., New York, N.Y. 10123.

FEBRUARY 10-11, WASHINGTON, D.C. — **Writing Management Reports.** Contact: Mary Ann Cluggish, Information Mapping, Inc., 275 Wyman St., Waltham, Mass. 02154.

FEBRUARY 10-12, ALBUQUERQUE, N.M. — **Fiber-Optic Technology Training.** Contact: Linda Castle, Optoelectronic System Consultants, P.O. Box 35525, Albuquerque, N.M. 87176.

FEBRUARY 10-12, ST. LOUIS — **Effective Systems Analysis and Design: Tools and Techniques.** Contact: Thomas J. Bisacquino, Director of Education, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

FEBRUARY 10-14, PORTLAND, MAINE — **Basic Systems Analysis.** Contact: Thomas J. Bisacquino, Director of Education, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

FEBRUARY 10-14, WASHINGTON, D.C. — **Writing Procedures, Policies and Documentation.** Contact: Mary Ann Cluggish, Information Mapping, Inc., 275 Wyman St., Waltham, Mass. 02154.

FEBRUARY 11-12, NEW YORK — **IBM's Master Plan, 1986-1990.** Contact: Yankee Group, 14th Floor, 89 Broad St., Boston, Mass. 02110. Also being held Feb. 18-19 in San Francisco.

FEBRUARY 13-14, WASHINGTON, D.C. — **Bypassing the Local Telephone Exchange: Third Annual Conference.** Contact: Conference Registrar, Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

WEEK OF FEB. 16

FEBRUARY 16-19, AUSTIN, TEXAS — **The DCEA Conference: Desktop Computers in Engineering and Architecture.** Contact: Donna Passons, University of Texas CLE Program, 727 E. 26th St., Austin, Texas 78705.

FEBRUARY 18-19, NEW YORK — **Intro to Dbase.** Contact: Center for Advanced Data Processing, Suite 402, 450 7th Ave., New York, N.Y. 10123.

See **CALENDAR** page 95

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CALENDAR from page 94

FEBRUARY 18-19, SAN JOSE, CALIF. — **Institute of Electrical and Electronics Engineers, Inc. 1986 Annual Meeting.** Contact: IEEE, Annual Meeting Department, 10th Floor, 345 E. 47th St., New York, N.Y. 10017.

FEBRUARY 20, LONDON — **Europe Invitational Computer Conference Series.** Contact: Beatrice Labbe-Anderson, International Conference Director, Invitational Computer Conference, No. C-2, 3151 Airway Ave., Costa Mesa, Calif. 92626. Also being held Feb. 25 in Frankfurt, Feb. 27 in Zurich, March 4 in Paris and March 10 in Tel Aviv.

FEBRUARY 20-21, MADISON, WIS. — **DBMS Software: Functions — Package Comparison.** Contact: Thomas J. Bisacquino, Director of Education, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138. Also being held Feb. 24-25 in Philadelphia.

WEEK OF FEB. 23

FEBRUARY 23-26, SAN FRANCISCO — **Seventh Structured Development Forum.** Contact: Garant and Associates, Seventh Structured Development Forum, 45 Via Navarro, Greenbrae, Calif. 94904.

FEBRUARY 24-26, MARINA DEL REY, CALIF. — **Trax User Conference.** Contact: Trax Softworks, Inc., 10801 National Blvd., Los Angeles, Calif. 90064.

FEBRUARY 24-28, LOS ANGELES — **Adajug/Sigada Conference.** Contact: Benjamin Brosgol, Vice-Chairman of Sigada, Alsys, Inc., 1432 Main St., Waltham, Mass. 02154.

FEBRUARY 24-29, PARIS — **MICAD '86.** Contact: Caby C. Smith, World Computer Graphics Association, Suite 399, 2033 M St. N.W., Washington, D.C. 20036.

FEBRUARY 26, DEDHAM, MASS. — **Marketing Strategies/Marketing Communications.** Contact: Frank R. Trocki, Graphic Arts Program, Northeastern University, Center for Continuing Education, 370 Common St., Dedham, Mass. 02026.

FEBRUARY 26-27, NEW YORK — **Intro to Symphony: The Spreadsheet — Symphony for Spreadsheet Users.** Contact: Center for Advanced Data Processing, Suite 402, 450 7th Ave., New York, N.Y. 10123.

FEBRUARY 26-28, NEW ORLEANS — **Innovative Systems, Inc. Annual Users Group Conference.** Contact: Innovative Systems, Inc., 341 Fourth Ave., Pittsburgh, Pa. 15222.

FEBRUARY 27, FORT LAUDERDALE, FLA. — **U.S. Invitational Computer Conference.** Contact: Suzanne Hubner, U.S. Conference Director, Invitational Computer Conference, No. C-2, 3151 Airway Ave., Costa Mesa, Calif. 92626. Also being held March 18 in San Jose, Calif., and April 2 in Nashua, N.H.

WEEK OF MARCH 2

MARCH 3-7, DENVER — **Sixth Annual Alpha Micro Users Society Convention.** Contact: Sharon Greene, Alpha Micro Users Society, 735 Walnut St., Boulder, Colo. 80302.

MARCH 4-6, PARIS — **Securicom '86 — Fourth Worldwide Congress on Communications Security and Protection.** Contact: Securicom-SEDEP, 8 Rue de la Michodiere, 75002 Paris, France.

MARCH 4-7, ORLANDO, FLA. — **Personal Financial Services.** Contact: Peggy Meyer, Bank Administration Institute, 60 Gould Center, Rolling Meadows, Ill. 60008.

WEEK OF MARCH 9

MARCH 10-14, DALLAS — **Second International Integrated Services Digital Networks Exposition.** Contact: Danae Fasano, Conference Coordinator, Information Gatekeepers, Inc., 214 Harvard Ave., Boston, Mass. 02134.

MARCH 12-14, DETROIT — **Artificial Intelligence for the Automotive Industry — The Demystification.** Contact: Dale Mason, Technical Activities Department, Society of Manufacturing Engineers, Computer and Automated Systems Association of SME, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

WEEK OF MARCH 16

MARCH 17-21, MILWAUKEE — **Test Data Acquisition and Processing for Instrumentation Applications.** Contact: John T. Snedeker, Program Director, Center for Continuing Engineering Education, University of Wisconsin at Milwaukee, 929 N. Sixth St., Milwaukee, Wis. 53203.

MARCH 18-21, LAS VEGAS — **Check Processing.** Contact: Peggy Meyer, Bank Administration Institute, 60 Gould Center, Rolling Meadows, Ill. 60008.

MARCH 19-21, BLACKSBURG, VA. — **Personal Computer Interfacing for Scientific Instrument Automation.** Contact: Linda Leffel, C.E.C., Virginia Polytechnic Institute and State University, Blacksburg, Va. 24061.

WEEK OF MARCH 23

MARCH 24-26, CHICAGO — **Systems One Conference and Exposition.** Contact: Michael A. Tew, Technical Activities Department, Society of Manufacturing Engineers, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

MARCH 24-27, SINGAPORE — **Artificial Intelligence '86 Conference: AI and its Applications — A State of the Arts Review.** Contact: John Tagler, Elsevier Science Publishers, 52 Vanderbilt Ave., New York, N.Y. 10017.

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Migent aims to save Ability from bankrupt Xanaro's strife

Court rules that source code be put up for sale

By Douglas Barney

INCLINE VILLAGE, Nev. — Although the firm that developed and marketed highly touted Ability software is bankrupt and about to be liquidated, Ability itself may soon have a new lease on life.

The new owner of the integrated micro program is expected to be Migent Software, Inc., a small micro applications developer based in Nevada. With a stable of former Ashton-Tate executives on board, Migent hopes that the bankruptcy of integrated software publisher Xanaro Technologies, Inc. may be a windfall for Migent.

Toronto-based Xanaro was forced into receivership, the Canadian equivalent of bankruptcy, when the firm's debts reached $5.6 million [CW, Jan. 20]. On Jan. 24, 1986, the Ontario Supreme Court recommended that Xanaro's assets, primarily the source code for Ability, be put up for sale. Although the assets will be open to bids from any source, Migent Chairman and President Carl Gritzmaker, Xanaro's former vice-president of sales, expects to purchase those assets.

"We are building the exact same thing I was going to build for Xanaro," Gritzmaker said. He has recruited Xanaro's 28-member sales staff for Migent and is negotiating with several software distributors in the U.S. and Europe.

Gritzmaker, a veteran of Ashton-Tate and Lotus Development Corp., has lured several key Ashton-Tate executives to Migent. Dan Wilkes, manager of corporate account support for Ashton-Tate, now holds the same title for Migent, and Phil Austin, formerly in charge of runtime and valued-added reseller sales for Ashton-Tate, will serve as manager of OEM and value-added reseller sales for Migent. Former Ashton-Tate area manager Ron Rinemann will serve as Migent's central district manager in Chicago.

Gritzmaker replaced Steve Spine, who had served as interim president of Migent after the resignation of Richard N. Hykes as chairman and president last year. Gritzmaker said that Robert Hryniak, the debt-plagued founder of Xanaro, will have no role at Migent. Hryniak could not be reached for comment.

Up to now, sales of Migent's first product, a $595 single-user microcomputer data base called Enrich, have been slow. "They have sold just a little bit of software, probably just a couple hundred packages at the most," Gritzmaker said.

With Gritzmaker on board, however, Migent hopes to broaden the appeal of both Enrich and Ability. Migent will release a multiuser version of Enrich targeted at the network versions of Ashton-Tate's Dbase III Plus and Microrim's R:Base 5000. The firm will also release a runtime version of Enrich, according to Spine.

Many other microcomputer data base companies have had difficulty competing with Ashton-Tate. To be viable, Migent must generate $10 million per year in sales of Enrich, which translates into some 40,000 units.

"It is not going to be easy because there is a tremendous momentum out in the marketplace from Ashton-Tate," Gritzmaker said. "But we certainly expect to compete with Ashton-Tate and Microrim."

Part of Migent's strategy is to garner sales to large corporations. Leading that charge is Michael Bird, former head of corporate accounts for Lotus and Ashton-Tate.

IBM may cut its stake in Intel

From page 122

source anything. This is a move to have multiple sources of microprocessors, including Advanced Micro Devices, Inc., and not get too tied in to one company."

IBM, however, stressed its long-term purchase agreement with Intel, which runs through 1990. The agreement is believed to include Intel's new 32-bit 80386 chip.

"In the long term, IBM will use its own microprocessors to make its workstations more blue, and the RT Personal Computer [CW, Jan. 27] is just the tip of the iceberg," said Frank Gens of International Data Corp. in Framingham, Mass. "But that process will take five years and should not have any impact on Intel's business in that time."

An IBM spokeswoman noted that the convertible debt offering enables IBM to raise cash at a lower interest rate than it would have had to pay on a straight stock or bond sale. The debt offering would affect only the shares of Intel that IBM has purchased on the open market since 1983, not its original cash investment in the company.

The offering would essentially allow investors to convert IBM debentures into Intel stock. The offering would affect 8 million of IBM's 22.5 million shares of Intel.

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DCA buys Forte to build telecommunications base

By Peggy Watt

ALPHARETTA, Ga. — Digital Communications Associates, Inc. (DCA) recently announced the acquisition of privately held micro-to-mainframe equipment maker Forte Communications, Inc. of San Jose, Calif.

Forte will continue to operate relatively independently as a wholly owned subsidiary of DCA. "DCA will provide the stability and help us when we get into large accounts," said Forte President James F. Ottinger, who will also become a DCA vice-president.

Forte will be the second significant partner in DCA's 14-year history. In 1983 DCA merged with Atlanta-based Technical Analysis Corp., developer of the Irma technology for micro-to-mainframe communications. Irma expansion boards and related peripherals for microcomputers are now DCA's flagship product line.

The Forte acquisition came after recent hints from Forte management that Forte was considering the acquisition of a smaller software company. Ottinger and DCA President Bertil D. Nordin, acquaintances for about 14 years, said the deal was spurred by casual conversation between them. "We were looking for a couple of key acquisitions to broaden our spectrum in telecommunications," Nordin said.

The presidents said they share similar strategies and expect few changes in day-to-day operations. Sales will be kept separate, but each sales staff will also be able to sell wares of the other firm, Nordin said.

There is little overlap in production between the two firms, but the presidents said the merger will be used to the best advantage in research and development. DCA manufactures and markets modular network processors, multiplexers, modems and gateway products. Forte focuses on terminal emulation products and mainframe graphics and applications software for the micro-to-mainframe market.

Forte reported $17 million in sales in fiscal year 1985 and $5 million for the first quarter of 1986. DCA posted sales of about $60 million in the first six months of fiscal 1986.

Under the acquisition agreement, which could be made final as soon as the end of this month, Forte shareholders will receive 695,052 shares of DCA common stock.

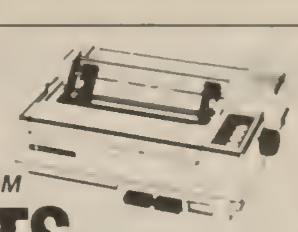
Computer Industry section begins on page 122.

Pay phone deal draws NATA fire

WASHINGTON, D.C. — The North American Telecommunications Association (NATA), representing telephone equipment equipment manufacturers, is accusing Northwestern Bell of manufacturing telephone equipment in violation of the 1983 AT&T divestiture terms.

NATA asked the U.S. Department of Justice to open an investigation of Northwestern Bell's pay telephone retrofit product, which turns pay phones into customer-owned private phones through the installation of a printed-circuit board.

NATA says that Northwestern Bell Technologies, a subsidiary of the telephone company, developed the product and then selected American Pay Phone Systems of Woodland Hills, Calif., to market it. Northwestern Bell issued no response to the charge.



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NICKELS AND DIMES

Altos Computer Systems reported revenue for the second quarter ended Dec. 28 of $36 million, compared with $26.6 million in the like quarter the previous year. Profits were $2.6 million, or 18 cents per share, compared with $1.7 million, or 12 cents per share, in the same period one year earlier.

■

AST Research, Inc. reported revenue for the second quarter ended Dec. 31 of $47.1 million, a 46% increase compared with $32.3 million in the like quarter the year before. Profits rose 102% to $8.6 million, or 74 cents per share, compared with $4.2 million, or 50 cents per share, in the same period a year earlier.

■

Northern Telecom, Inc. reported net earnings for the fourth quarter of $116 million, or $1 per share, compared with $115 million, or 99 cents per share, in the corresponding period one year before. Revenue for the quarter was $1.6 billion, compared with $1.4 billion the previous year.

■

Daisy Systems Corp. announced revenue for the first quarter ended Dec. 31 of $36.6 million, a 44% increase over the previous year's first-quarter revenue of $25.5 million. Profits were $6.3 million, or 35 cents per share, compared with $4.3 million, or 27 cents per share, in the like period a year before.

■

Wyse Technology, Inc. reported revenue for the third quarter ended Dec. 31 of $34.5 million, compared with $22.3 million in the previous year. Profits were $3.2 million, or 31 cents per share, compared with $2.2 million, or 27 cents per share, in the same period one year before.

■

Massachusetts Computer Corp. announced revenue for the second quarter ended Dec. 29 of $13.6 million, compared with $12.3 million a year earlier. Profits were $449,000, or 3 cents per share, compared with $1 million, or 9 cents per share, the year before.

■

Bolt Beranek and Newman, Inc. reported net income for the second quarter ended Dec. 31 of $2.6 million, or 30 cents per share, on revenue of $44.5 million. This compares with net income of $2 million, or 24 cents per share, on revenue of $32 million in the like period a year earlier.

■

Lexidata Corp. reported revenue for the first quarter ended Dec. 28 of $6 million with a net loss of $1.2 million, or 17 cents per share. This compares with revenue of $59 million and a net loss of $955,000, or 17 cents per share, for the comparable period the previous year.

■

Western Digital Corp. reported revenue for the second quarter of $64 million, a 66% increase over $38.5 million in the like period a year before. Profits were $4.3 million, or 22 cents per share, compared with $2.8 million, or 15 cents per share, in the same quarter one year earlier.

■

Quantum Corp. announced revenue for the third quarter ended Dec. 29 of $30.5 million, compared with $31.2 million a year earlier. Profits were $5.2 million, or 54 cents per share, compared with $6 million, or 62 cents per share, the year before.

■

Valid Logic Systems, Inc. reported revenue for the year of $56.1 million, compared with $48.3 million in

See **NICKELS** page 100

Shaking off the marketing bug

From page 122

ference and at other shows, the ironic part of this is that the target audience of the aforementioned sales hype isn't even there to hear it. With few computer maintenance users in attendance in San Diego, the expressed virtues of the various service firms were falling mainly on the ears of other service firms — their competitors. Potential strategic partners perhaps, but certainly not the guy who's going to deliver the maintenance contract for a DP shop full of 3081s.

To give credit where credit is due, however, several presenters rose above the corporate-hype level to contribute meaningful expertise to the Frost & Sullivan conference. Certainly they mentioned their own companies and what they do — but in the context of an overall issue of interest to the service business.

Attendees seemed particularly impressed with presentations by Mike Bergamo of Mohawk Data Sciences Corp., George Fenwick of RT/Katek Communications Group, Tom McLaughlin of Technical Support Services, Inc. and Bob MacGonigal of CPX, Inc. Conference Chairman Mike MacNaughton, it should also be noted, presented a strong overview of the third-party industry's steady growth and the key trends within the industry.

The third-party service conference therefore received a mixed report card from most participants. But the sessions at just about every industry forum, from the National Computer Conference on down, suffer from the same afflication. Corporate spokesmen could gain a hefty dose of credibility at conferences by leaving their marketing spiels at the power lunch table and addressing the substantive issues that their session titles imply.

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Industry mans battle stations for war against software pirates

Awareness campaigns, legislation proposed

By James A. Martin

The software industry and its organizations are planning to wage an escalated battle in 1986 against a long-time formidable foe, the pirate.

Claiming the loss of revenue to piracy, industry vendors and organizations are launching or increasing public awareness campaigns this year. Meanwhile, they are awaiting the outcome of a congressional report that many hope will generate legislation proposing increased enforcement and stricter laws pertaining to illegal software reproduction. The report, due early this year, is being prepared by the Office of Technology Assessment.

The Association of Data Processing Service Organizations, Inc. (ADAPSO) kicked off an antipiracy campaign last year with a well-publicized suit against American Brands, Inc., charging that one of its subsidiaries, Wilson Jones Co. of Chicago, had pirated software. The organization also spent much of 1985 developing and attempting to gain industry support for a technology standard that provides lock-and-key protection against the use of unauthorized software copies.

The U.S. Department of Justice said recently that it would not oppose the standard [CW, Jan. 13], but several micro software vendors have been reluctant to back it due to economic uncertainty and the fear of end-user backlash.

Although there are few hard statistics on the number of illegally reproduced software programs, a January 1985 survey by Future Computing, Inc. suggested that one of every two software copies in use is an unauthorized version. If one of every four of those pirated programs had been purchased, the industry would have gained $800 million in revenue.

Currently, software piracy is considered a copyright and trademark violation, making it a misdemeanor. According to Geoff Berkin, associate counsel for Ashton-Tate in Torrance, Calif., "We are interested in lobbying to get criminal copyright infringement recognized as a felony. With a misdemeanor crime, it's asking a lot for federal prosecutors to pour resources into going after offenders."

According to vendors, the need to educate users and change attitudes is as important as stronger enforcement. There is a sentiment among many home users and some corporate MIS and DP departments that copying software programs is really no crime.

"It has been suggested that the only crimes involved are the outrageous prices and dismal quality of software products," said Robert Campbell, president of Advanced Information Management, Inc., a computer and communications security consulting firm in Woodbridge, Va. "With those attitudes, it's no wonder there's such a problem."

In 1986, ADAPSO plans to hire an independent firm to assess the results of its 1985 programs to determine if it "has been thrashing mightily and getting nowhere," according to David B. Sturtevant, senior director of public relations for ADAPSO.

In the future, most agree, the federal government will play an increasing role in software piracy cases. "The involvement of federal authorities will increase simply because industry groups have done a masterful job of raising the issues and creating an awareness," Campbell said.

Ashton-Tate to launch fight

TORRANCE, Calif. — Ashton-Tate last week announced that it intends to spearhead a fight against piracy of U.S. vendors' software programs in foreign countries.

The announcement came after a U.S. trade official's two-month stint at Ashton-Tate corporate headquarters. U.S. Department of Commerce specialist Raymond Ahlberg discussed several courses of action with Ashton-Tate executives, including the establishment of a software industry "war chest" to finance litigation and awareness programs overseas.

Overseas sales accounted for 22% of Ashton-Tate's revenue in fiscal 1985, and the percentage is expected to increase as foreign marketplaces grow faster than the U.S. microcomputer software demand.

"Internationally, we are focusing on commercial piracy in which illegal copies of programs and documentation are sold for profit, causing a substantial revenue drain for U.S. companies," said Ronald S. Posner, Ashton-Tate's executive vice-president of sales and international operations.

Ashton-Tate is encouraging the U.S. government to enforce strictly antipiracy provisions currently on the books.

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MERGERS AND ACQUISITIONS

Minneapolis-based **Lee Data Corp.** recently announced the acquisition of **Datastream Communications, Inc.** of Santa Clara, Calif., for $3 million in cash.

Datastream is a 6-year-old, privately held vendor of IBM 3270-based hardware, including protocol conversion controllers and terminals. The company also develops microcomputer-to-mainframe software products. Datastream's revenue were about $7 million for the year ended June 30.

The acquisition also calls for Lee Data to receive a specified percentage of Datastream revenue for two years and issues warrants for Datastream to purchase 500,000 shares of Lee Data stock.

■

Epson Corp. has merged with its parent company, **Suwa Seikosha Co.**, to form a new company that will operate under the name **Seiko Epson Corp.**

The new company will be headquartered in Nagano, Japan. Epson America, Inc. is located in Torrance, Calif.

■

Tallgrass Technologies Corp. announced the acquisition of **Gemini Software, Inc.** Gemini Software has become a Tallgrass subsidiary and will operate under the name of **Tallgrass Software Technologies, Inc.**

■

Uccel Corp. announced the sale of its Univac data processing service business to **Bechtel Power Corp.** Uccel is located in Dallas.

■

Ungermann-Bass, Inc. has offered to purchase 20% of **Allied Data Communications Group, Inc.** from its founders in exchange for Ungermann-Bass stock. Under the offer, Ungermann-Bass will also receive from the founders options to acquire an additional 10% of Allied.

■

Computer Task Group, Inc. announced it has acquired **Documentation Resources, Inc.**, a computer services company headquartered in Pheonix, and **Data Force, Inc.**, a computer services company headquartered in Seattle.

■

Effective immediately, **Communications Satellite Corp.** (Comsat) and **Communications Consulting Corp.** have reached an agreement on the purchase of Comsat subsidiary Compact Software, Inc. by Communications Consulting.

■

Avant-Garde Publishing Corp. completed the acquisition of **Strictly Soft Ware, Inc.**, a software catalog company that is based in Granville, Ohio.

■

Data Card Corp. announced that it has entered into an agreement in principle to acquire **Security Imprinter Corp.** of Walkersville, Md., for an undisclosed amount of Data Card common stock. The transaction is subject to the approval of Data Card's board of directors.

■

AGS Computers, Inc. of Mountainside, N.J., through its subsidiary, **Microamerica, Inc.**, has signed a letter of intent to acquire **Compuserve, Inc.**, a distributor of hardware and software that is headquartered in Toronto.

Compuserve will become a wholly owned subsidiary of Microamerica but will continue to operate as an independent Canadian company.

■

Management Support Technology, Inc., a Denver-based developer of expert system software products, signed a letter of intent to merge with **Applied Data Systems, Inc.**, a nonpublic company based in Scottsdale, Ariz.

NICKELS from page 97

the previous year. Profits for the year were $1.9 million, or 13 cents per share, compared with $6.3 million, or 46 cents per share, one year before.

■

Pyramid Technology Corp. reported revenue for the first quarter ended Dec. 27 of $11.5 million, a 76% increase from $6.5 million in the corresponding period one year before. Profits were $1.4 million, or 21 cents per share, compared with $101,000, or 2 cents per share, in the like period one year earlier.

■

Priam Corp. announced revenue for the second quarter ended Dec. 31 of $33.8 million, compared with $25.3 million for the same quarter the year before. Profits were $1.8 million, or 7 cents per share, compared with a net loss of $8.9 million, or 39 cents per share, for the like period a year earlier.

■

Rexon, Inc. reported revenue for the first quarter ended Dec. 29 of $12.7 million, a 109% increase from $6.1 million for the like period a year before. Profits were $680,000, or 9 cents per share, compared with a net loss of $1.7 million, or 56 cents per share, reported for the comparable period a year before.

■

Xidex Corp. announced that the company's revenue for the quarter ended Dec. 31 was $94.4 million, compared with $50.6 million one year before. Profits for that quarter were $5.8 million, or 14 cents per share, compared with $5.8 million, or 25 cents per share, in the corresponding period one year before.

■

Cipher Data Products, Inc. reported revenue for the second quarter ended Dec. 31 of $37 million, compared with $47.3 million recorded in the year before. Profits were $1 million, or 7 cents per share, compared with $4.6 million, or 32 cents per share, in the corresponding period one year earlier.

■

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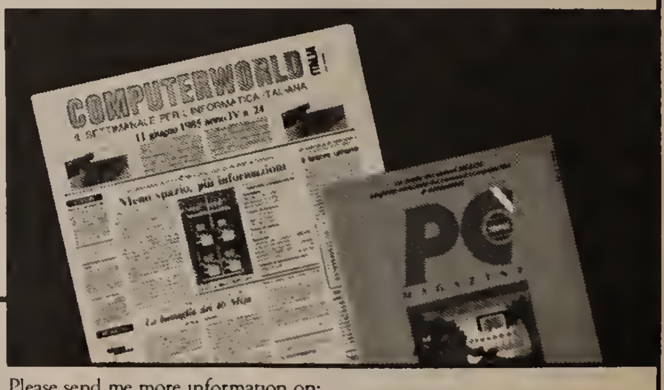

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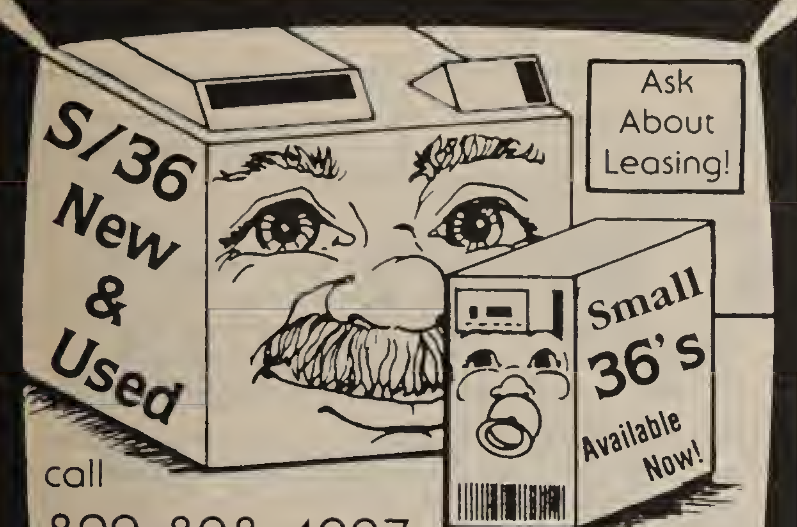
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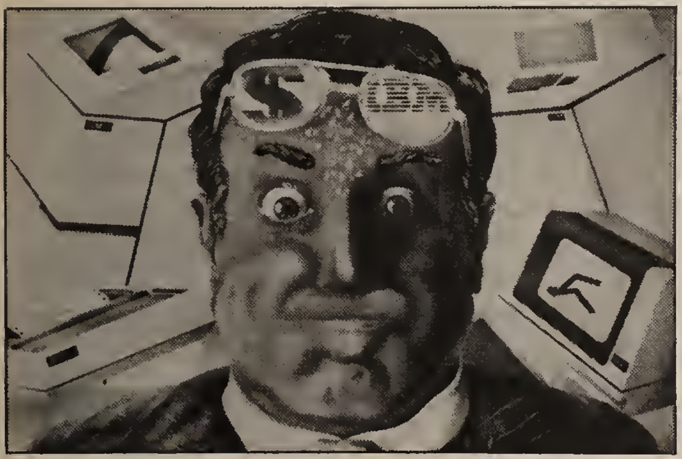

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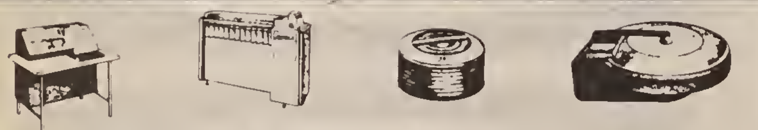

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Position Announcements, Buy • Sell • Swap, Software For Sale, Software Wanted, Time & Services, Bids & Proposals, Business Opportunities, Real Estate, Auctions, Positions Wanted, Seminars & Conferences, Publications and The Bulletin Board

Our BULLETIN BOARD section is ideal for the smaller companies who want a low-cost way to sell pieces of equipment (hardware or software). The BULLETIN BOARD is laid out as a quick reference for potential buyers who know what they are after.

So, as a nationwide publication, we give you the exposure you want. As a weekly publication, we give you the immediacy your advertisements need.

A number of Executive Reports and Product Spotlights are scheduled to run in **COMPUTERWORLD** during 1986. Each of these features will focus on one aspect of the computer industry and give our advertisers a chance to reach a more select audience. These are some of the topics the features will cover:

Executive Reports

- Feb 24 - **Application Software Development**
- Mar 3 - **Mass Storage Systems**
- Mar 17 - **Managing Voice & Data Communications**
- Mar 24 - **Personal Computer Networks**
- Apr 28 - **Software Maintenance**
- May 19 - **Electronic & Voice Mail**
- June 30 - **integrated OA Systems**
- July 21 - **PBX Networks**

Product Spotlights

- Feb 17 - **2400 bit./sec. Modems**
- Mar 10 - **32-bit Workstations**
- Mar 31 - **Mainframe & Mini DBMS**
- Apr 21 - **Non-Impact Printers**
- May 12 - **Disaster Recovery**
- June 2 - **Word Processing Software**
- June 23 - **Personal Computer Graphics**

COMPUTERWORLD publishes every Monday with an ad deadline of 10 days prior to each issue date. The issue of February 17th will be closing February 7th. You may send in copy to be pubset or camera-ready material (velox or negative) via the mail. We provide telecopier service and will also take ads over the phone.

Information concerning classified advertising rates, color costs, ad sizes, mechanical specifications along with more detailed information on the special issues is contained in the 1986 Rate Card #21 and Media Kit. Or from our offices.

Our mailing address is

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Sealed proposals will be received by the CDPA, 301 N Lamar St., 301 Building, Suite 508, Jackson, MS 39201 for the following data processing equipment and services:
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Request for Proposal No. 1077, due Tuesday, March 18, 1986 at 3:30 p.m. for the acquisition of a financial management and accounting system for implementation within an Amdahl 5868 host and SNA distributed networking environment under MVS/XA to serve the agencies of MISSISSIPPI STATE GOVERNMENT
Request for Proposal No. 1078, due Thursday, March 13, 1986 at 3:30 p.m. for the acquisition of a turnkey laboratory information system that must interface with an existing IBM mainframe system for the UNIVERSITY OF MISSISSIPPI MEDICAL CENTER.
Request for Proposal No. 1079, due Thursday, February 13, 1986 at 3:30 p.m. for the acquisition of maintenance services for IBM tape and I/O equipment installed at the STATE COMPUTER CENTER.
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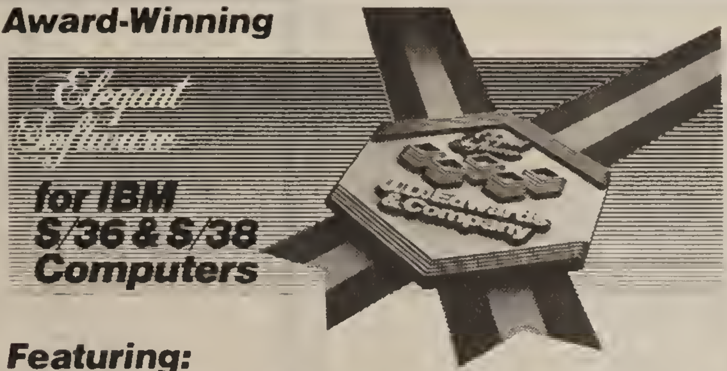

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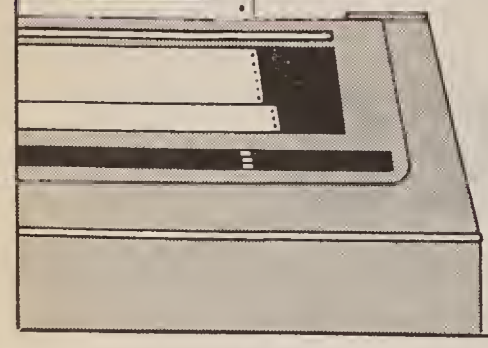

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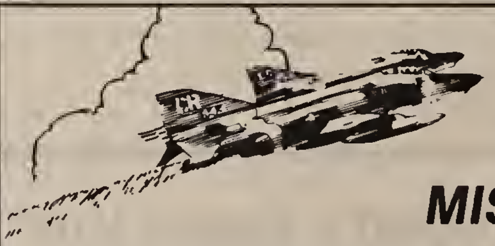

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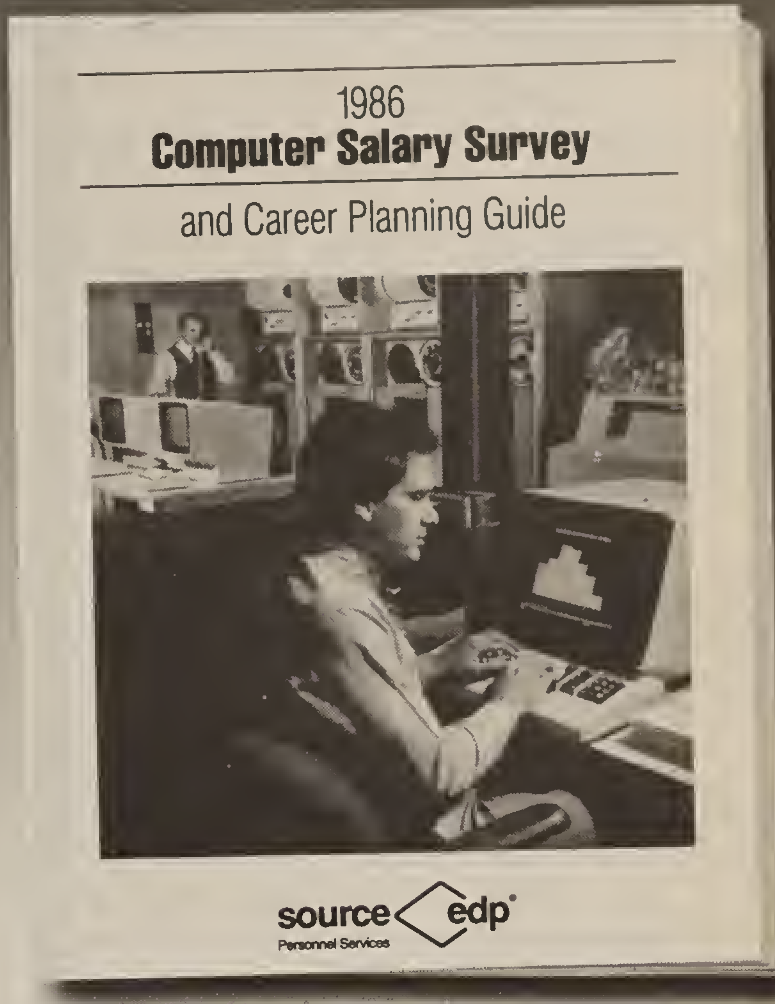

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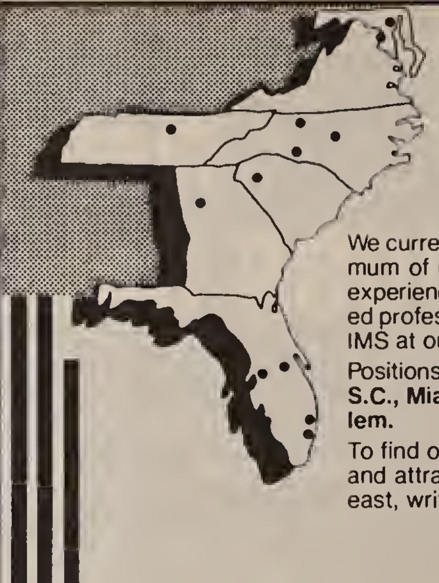

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The deadline for applications is February 15, 1986.

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Foreign Editorial/ Sales Offices

Argentina: Ruben Argento, Computerworld Argentina, Av. Belgrano 406-Piso 9, CP 1092 Buenos Aires. Phone: 34-5583/5584. Telex: 22644.

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INDUSTRY NOTES

Comdisco, IBM Credit continue to show strong financial growth

The top two computer leasing companies continued to show strong growth, with both **Comdisco, Inc.** and **IBM Credit Corp.** reporting 47% revenue gains for the quarter ending in **December**. Comdisco reported record profits of $23.5 million and record revenue of $225 million for its first quarter. Comdisco also acknowledged that a shareholder has filed a class action lawsuit alleging that the company failed to inform shareholders about the facts leading to Comdisco's current $200 million tax dispute with the **Internal Revenue Service** [CW, Jan. 20].

IBM Credit said fourth-quarter earnings rose 28.3% to $28.5 million on revenue of $148.9 million. For the year, profits rose 61% to $103 million, and revenue was up 70% to $504.2 million.

■

Winchester disk drive manufacturer **Quantum Corp.** of **Milpitas, Calif.**, received a $6 million out-of-court settlement from **Computer Memories, Inc.** of **Irvine, Calif.**, in a 1983 suit alleging patent infringements on the **Quantum Q2000** disk drive.

■

Start-up workstation manufacturer **Counterpoint Computers** of **San Jose, Calif.**, announced strategic alliances with **AT&T Information Systems**, **Kyocera Corp.** of **Japan** and **British & Commonwealth Ltd.** of the **UK.**

AT&T said that it will market Counterpoint's **Unix**-based workstation, scheduled for introduction **March** 3.

■

Wang Laboratories, Inc. recently received a plum $480 million, five-year MIS contract from the **U.S. Air Force**. Wang will supply some 1,600 **VS** minicomputers as well as **Professional Computers**, **Wang Office** departmental software, networking products and peripherals.

■

Sun Microsystems, Inc. of **Mountain View, Calif.**, recently filed an initial public offering of 4 million shares of common stock. Founded four years ago this month, The technical workstation vendor was reportedly spurred to go public by the recent introduction of **IBM's RT Personal Computer** as a competitor.

■

Management Science America, Inc. last week reported 1985 revenue of $151.6 million, an increase from $141.8 million in 1984. Income from continuing operations declined, however, from $13.7 million in 1984 to $6.9 million. Earnings per share from continuing operations were 39 cents for 1985, compared with 77 cents per share for 1984.

Slump continues to mar industry

From page 122

and Symphony will account for a declining percentage of revenue as Lotus diversifies into scientific and information services markets.

Analyst William Shattuck of Montgomery Securities estimated those current percentages are 65% for 1-2-3 and 30% for Symphony. He predicted that Lotus will rebound strongly in the second half of 1986 when its recent acquisitions begin to bring in solid revenue.

AT&T's fourth-quarter profits dip of 1.6%, or 1 cent per share, reflected sluggish sales and rentals of both computer and telephone equipment. Other potential factors included payment of an antitrust settlement to MCI Communications Corp. and write-downs from the abandoned Net 1000 computer project [CW, Jan. 27]. Revenue grew 8.4% to $9.12 billion.

For the year, profits rose 13.6% on a 5.2% gain in revenue. AT&T earned $1.55 billion, or $1.37 per share, on sales of $34.91 billion. In 1984, the firm earned $1.37 billion, or $1.25 per share, on $33.19 billion in sales.

"We're doing better, but the difficulties of rebuilding from divestiture persist, and consequently, our financial performance continues to fall short of our expectations," AT&T Chairman Charles L. Brown said.

The following are recently reported financial results of other firms:

■ **Texas Instruments, Inc.** Citing the year-long recession in the semiconductor market and the computer industry, TI reported a "devastating" loss for 1985 of $118.7 million, or $4.76 per share, compared with net income of $316 million, or $13.05 per share, in 1984. Net sales were $4.9 billion, compared with $5.7 billion a year earlier, a decline of 14%. TI lost $41.2 million, or $1.64 per share, in the fourth quarter as revenue fell 20.2% to $1.21 billion.

■ **MCI.** The No. 2 long-distance services company said income from operations nearly doubled in the fourth quarter, but a $26.3 million one-time interest charge resulted in a 37% drop in profits to $8.3 million, or 4 cents per share. Revenue rose 38% to $721.4 million.

For the year, MCI's profits, boosted by $206.6 million in antitrust payments from AT&T, jumped 91.3% to $113.3 million, or 48 cents per share. Income from operations grew 17.7%, and revenue increased 29.7% to $2.54 billion.

■ **Convergent Technologies, Inc.** Despite a 14% revenue drop, the San Jose, Calif., workstation maker earned $5.1 million, or 14 cents per share, in the fourth quarter, compared with an $11.9 million, 33-cent-per-share loss in the year-earlier period. For the year, Convergent earned $11.5 million, or 32 cents per share, compared with $687,000, or 2 cents per share, from continuing operations in 1984. Sales grew by 9.2% to $395.2 million.

Two steps backward, one forward: Cullinet races to recover momentum

ACTIVE ISSUES
Kathy Porteus

Will Cullinet Software, Inc. regain its momentum?

After 29 consecutive quarters of 50% growth, Cullinet (New York Stock Exchange — 17¼) reported two down quarters for the first half of its 1986 fiscal year ending April 30. As a result, "Cullinet has become more deliberate in either its willingness or ability to provide guidance to investors," observes Kenneth J. Burke, securities analyst and vice-president with Alex Brown & Sons.

Burke estimates Cullinet's third quarter, which ended Jan. 31, will reach earnings of 17 cents per share, down from 21 cents per share for the same period last year. "But I think this estimate is on the optimistic side," he acknowledges.

Most analysts doubt Cullinet will ever return to the lofty days of 40% to 50% growth. Analysts cite negative economic and market factors and IBM's data base management system (DBMS), DB2, as key issues clouding Cullinet's future. However, few fault Cullinet's strategic decisions for the company's current troubles.

"You won't see Cullinet's business turn in two quarters, but I think the company will gradually improve," says Terrence Quinn, a vice-president with Dean Witter Reynolds, Inc. Quinn says he expects Cullinet to achieve 25% growth "on a long-term basis, which will be hitting on all cylinders."

Part of Cullinet's trouble lies in the nature of selling mainframe software. Operating expenses are generally controllable, but because prospective customers typically do not sign until the end of the quarter, "software firms are flying blind, for the most part, until the quarter actually closes," explains Rick Sherlund, senior securities analyst with Goldman, Sachs & Co.

According to Burke, the gross profitability of each sale runs so high that a big sale could have a significant impact on net income. By emphasizing bigger sales, Cullinet "has increased the potential for earnings instability."

Another key factor affecting Cullinet, according to Dean Witter's Quinn, is what the user can afford to pay out right now. As data processing budgets came under pressure last year, the smaller initial fee that IBM's DB2 required was attractive in comparison with the $300,000 to $400,000 up-front charge of Cullinet's product, Quinn says. In four years, the cost of IBM's DB2 and Cullinet's IDMS/R reportedly evens out.

In its second fiscal 1986 quarter, ended Oct. 31, Cullinet's receivables increased, Quinn maintains, "because the company had to offer extremely attractive credit and payment terms" in order to move its products. Quinn says that aside from DB2's market presence, independent software firms are hurt by each other's aggressive pricing.

User confusion, caused in part by premature vendor claims of fully relational data base systems, characterizes today's DBMS market. What constitutes relational technology is currently an open-ended question, as evidenced by the heated correspondence in recent issues of *Computerworld* between E. F. Codd, developer of the relational model for data management, and John Cullinane, Cullinet's chairman. According to Quinn, Cullinet is now trying to reeducate users on the true characteristics of IDMS/R, while explaining the benefits of a networked data base with relational functionality.

Sherlund says he believes Cullinet expanded into applications software early, recognizing the growing saturation of the data base software market. Yet Sherlund observes that all of Cullinet's applications are built on IDMS/R. "IBM can hurt this foundation," he says.

Beyond integrating applications around IDMS/R, Burke suggests, "Cullinet may have to look outside the IBM environment for additional revenue sources." Meanwhile, investors are adopting a wait-and-see attitude as Cullinet's stock price hovers in the $18 range.

Porteus is president of Strand Research Associates, a Centerville, Mass.-based company that provides customized research services for financial and high-tech firms.

DG looks to June recovery

From page 122

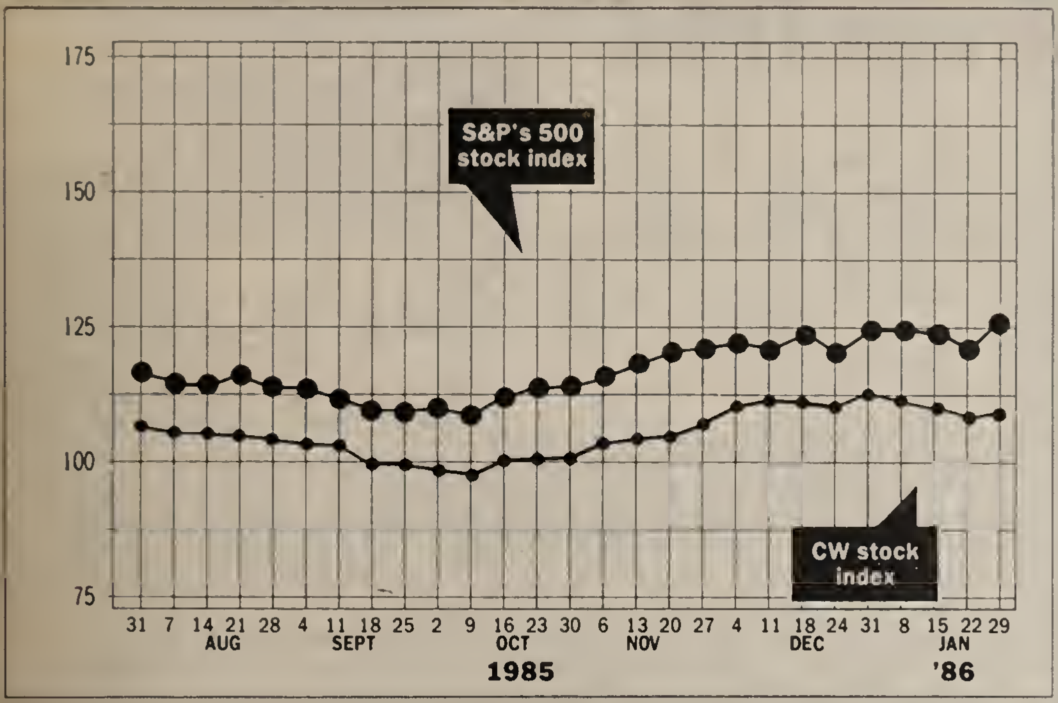
Revenue from OEM sales declined in 1985, he noted, while end-user sales experienced steady growth. He also noted that revenue from service has grown steadily at about 22% annually for five years, while hardware sales grew only 3% in 1985 after a 48% jump in the previous year.

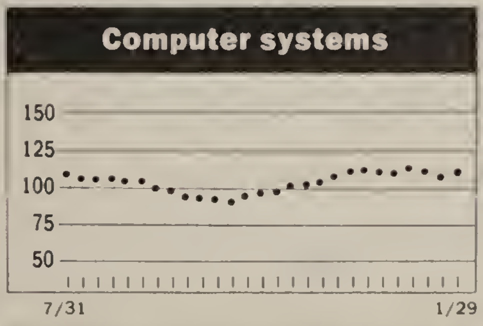
The 1985 manufacturing slowdown has resulted in DG's highest cash position ever, with $327.5 million on hand at the end of fiscal 1985. "Our cash balance is appropriate for a much larger company," said Vice-President and Chief Financial Officer Kenneth Jaeggi. "We're waiting for the company to catch up."

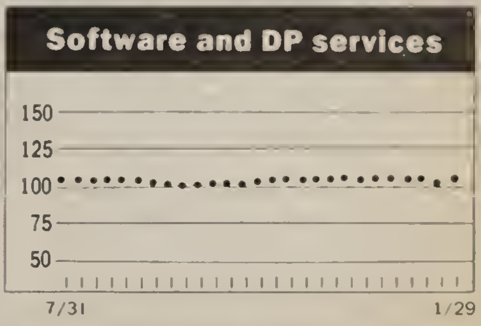
De Castro said the MV/20000 computer, MV/20000DC departmental system and other products announced late last year [CW, Nov. 25] will be priced at higher margins than current offerings and that DG's fiscal health should improve accordingly in approximately three months. "If we're still telling the same story after the next quarter, we'll have something to worry about," said DG spokesman Ken Donoghue.

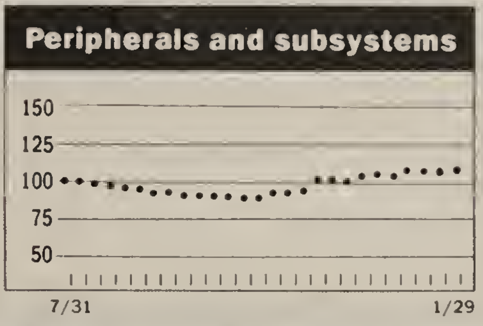
MITCHELL I. HAYES

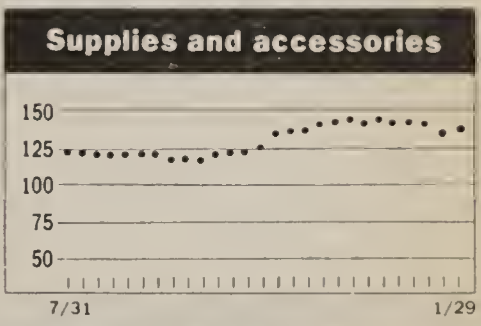
Computerworld stock trading index

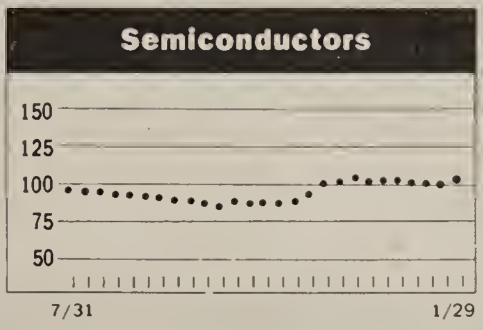


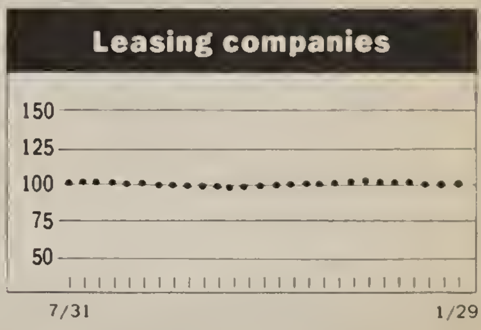

Computer systems


Software and DP services


Peripherals and subsystems


Supplies and accessories


Semiconductors


Leasing companies

All indexes reflect a historical base of 100 on Dec. 31, 1984, and trace stock market performance in relation to that base. The CW stock index represents the unweighted average performance of the six categories of computer industry stocks.

	1/22/86	1/29/86
Computer systems	110.3	**113.0**
Software and DP services	103.9	**104.0**
Peripherals and subsystems	103.0	**105.1**
Supplies and accessories	128.7	**129.7**
Semiconductors	102.7	**103.4**
Leasing companies	103.0	**102.7**
CW stock index	109.1	**109.9**
Standard and Poor's 500 stock index	121.7	**125.7**

Computerworld stock trading summary

CLOSING PRICES WEONESOAY, JANUARY 29, 1986

COMPUTER SYSTEMS

EXCH		PRICE			
		52-WEEK RANGE (1)	CLOSE JAN 29 1986	WEEK NET CHNGE	WEEK PCT CHNGE
O	ALPHA MICROSYSTEMS	5- 9	6 1/4	+1/4	+4.1
O	ALTOS COMPUTER SYST	9- 14	12 7/8	0	0.0
A	AMOAHL CORP	10- 18	15 3/4	+1 1/4	+8.6
O	APPLE COMPUTER INC	14- 31	23 5/8	+1/4	+1.0
O	APPOLLO COMPUTER	9- 31	12 3/4	-3/4	-5.5
N	AT&T	19- 28	22 3/8	+1/4	+1.1
N	8URROUGHS CORP	52- 69	68 3/4	+5 1/8	+8.0
O	COMPAQ COMPUTER CP	5- 14	13 7/8	+1 1/8	+8.8
O	COMPUTER AUTOMATION	1- 9	2 1/2	+1/2	+25.0
A	COMPUTER CONSOLES	5- 14	7 1/8	+1/8	+1.7
N	CONTROL DATA CORP	15- 39	20 1/4	+3/8	+1.8
O	CONVERGENT TECHNOL	5- 13	13 1/8	+3/4	+6.0
O	CPT CORP	5- 8	5 3/4	-1/4	-4.1
N	CRAY RESEARCH INC	25- 71	65 7/8	+6	+10.0
O	OAISY SYSTEMS CORP	19- 38	18 1/2	-2 3/4	-12.9
N	DATA GENERAL CORP	31- 76	42	+3/4	+1.8
N	OATAPOINT CORP	5- 22	5 1/8	+1/8	+2.5
N	OIGITAL EQUIPMENT	85- 153	153	+8 5/8	+5.9
A	EECO INC	13- 16	14 1/2	0	0.0
N	ELECTRONIC ASSOC.	3- 6	4 1/8	-3/8	-8.3
N	FLOATING POINT SYST	18- 37	35 1/2	+1/8	+0.3
N	FOX8ORO	22- 31	24	-1 3/4	-6.7
N	GOULO INC	20- 38	26 3/8	-1	-3.6
N	HARRIS CORP	22- 35	26 7/8	+1	+3.8
N	HEWLETT-PACKARO CO	29- 40	39 1/2	+1/8	+0.3
N	HONEYWELL INC	54- 87	74 3/4	+5/8	+0.8
N	I8M	117- 156	151	+6 3/4	+4.6
O	IPL SYSTEMS INC	1- 4	1 1/4	0	0.0
N	ITT CORP	28- 39	38 1/2	+1 3/4	+4.7
N	M/A-COM INC	13- 24	12 7/8	-3/4	-5.5
N	MANAGEMENT ASSIST	2- 28	2	0	0.0
N	MATSUSHITA ELEC(AOR)	49- 69	68 7/8	+5 1/2	+8.6
O	MENTOR GRAPHICS	13- 30	17 1/8	+1/4	+1.4
N	MOOULAR COMPUTER SYS	6- 8	6 7/8	-1/8	-1.7
N	MOHAWK OATA SCI	1- 13	2	0	0.0
N	N8I INC	11- 20	10 7/8	+1/8	+1.1
N	NCR	25- 44	43 5/8	+2 1/8	+5.1
N	PERKIN-ELMER	22- 34	33 1/2	+1 5/8	+5.0
N	PRIME COMPUTER INC	15- 25	24 3/4	+2 1/2	+11.2
N	SPERRY CORP	39- 59	42 1/2	+1/4	+0.5
O	STRATUS COMPUTER INC	9- 25	22 1/2	+1	+4.6
O	TANOEM COMPUTERS INC	13- 29	23 1/8	+1	+4.5
N	TANDY CORP	24- 42	39 5/8	+1 7/8	+4.9
O	TELEVIOEO SYSTEMS	2- 4	3	0	0.0
O	TELXON CORP	10- 23	23	0	0.0
N	TEXAS INSTRUMENTS	86- 132	108	+1 1/2	+1.4
A	ULTIMATE CORP	8- 26	26 1/4	+2 5/8	+11.1
O	VECTOR GRAPHICS INC	0- 1	1/8	0	0.0
A	WANG LABS "B"	15- 29	19 1/2	+5/8	+3.3
A	WANG LA8S "C"	15- 29	19 1/2	+3/4	+4.0
N	XEROX CORP	37- 61	61 3/8	+3	+5.1

SUPPLIES & ACCESSORIES

EXCH		52-WEEK RANGE (1)	CLOSE JAN 29 1986	WEEK NET CHNGE	WEEK PCT CHNGE
N	AMERICAN 8US PROOS	21- 35	29 5/8	0	0.0
N	8ARRY WRIGHT	17- 29	18 3/4	-3/4	-3.8
A	OUPLEX PROOUCTS INC	13- 22	19 7/8	+1 1/4	+6.7
N	ENNIS BUS. FORMS	14- 24	21 7/8	-1/2	-2.2
N	3M COMPANY	74- 92	88 3/4	-1/2	-0.5
N	MOORE CORP LTO	15- 22	19 3/8	+3/4	+4.0
O	STANDARD REGISTER	22- 39	33 1/2	-1/4	-0.7
N	WALLACE COMP SERVICE	30- 41	39 1/4	+7/8	+2.2

EXCH: N=NEW YORK; A=AMERICAN; P=PACIFIC; 8=BOSTON;
L=NATIONAL; M=MIOWEST; O=OVER-THE-COUNTER

O-T-C PRICES ARE BIO PRICES AS OF 3 P.M. OR LAST 8IO
(1) TO NEAREST DOLLAR

SOFTWARE & OP SERVICES

EXCH		PRICE			
		52-WEEK RANGE (1)	CLOSE JAN 29 1986	WEEK NET CHNGE	WEEK PCT CHNGE
O	AOVANCEO COMP TECH	2- 4	3 3/4	-1/4	-6.2
N	AOVANCEO SYSTEMS INC	9- 18	17 1/4	+3/8	+2.2
N	AGS COMPUTERS INC	10- 24	22 5/8	+1 7/8	+9.0
O	AMERICAN SOFTWARE	9- 15	13 3/4	0	0.0
N	ANACOMP INC	2- 4	3 3/8	0	0.0
O	ANALYSTS INTL CORP	5- 11	6 1/2	-1/2	-7.1
O	ASHTON TATE	6- 21	20 5/8	+1 1/4	+6.4
O	ASK COMPUTER SYSTEMS	7- 25	11 5/8	-1 1/8	-8.8
8	ASTRAOYNE COMP INO	1- 3	2	0	0.0
N	AUTOMATIC OATA PROC	35- 62	61 1/2	+1 3/8	+2.2
O	COMPUTER NETWORK	5- 9	4 7/8	-3/8	-7.1
O	COMPUTER ASSOC INT'L	18- 35	34 1/2	+1 1/2	+4.5
O	COMPUTER HORIZONS	5- 11	10 5/8	+1/4	+2.4
N	COMPUTER SCIENCES	13- 34	32 3/4	+2 1/4	+7.3
O	COMPUTER TASK GROUP	10- 24	22 1/2	-3/4	-3.2
O	COMPUTER USAGE	1- 3	1 5/8	0	0.0
O	COMPUTONE SYSTEMS	4- 11	4 1/4	-1/2	-10.5
O	COMSERV CORP	1- 6	3 1/2	0	0.0
O	COMSHARE	7- 12	11	+1/8	+1.1
N	CULLINET SOFTWARE	13- 33	15	-2	-11.7
O	CYCARE SYSTEMS INC	19- 27	20	-1/4	-1.2
O	HOGAN SYSTEM INC	4- 12	8 1/4	-1/2	-5.7
N	GENERAL ELECTRIC CO	56- 74	69 7/8	+2 7/8	+4.2
N	GENL MOTORS E (EOS)	20- 47	40 1/4	+5/8	+1.5
N	GTE CORP	38- 49	48 5/8	+2 3/8	+5.1
O	INFORMATION SCIENCE	1- 5	2 1/4	+1/4	+12.5
O	INFOTRON SYSTEMS CP	13- 24	15 1/4	+3/4	+5.1
O	KEANE ASSOCIATES	10- 20	13 3/4	-1/2	-3.5
N	LOGICON	25- 43	36 5/8	-2 3/8	-6.0
O	LOTUS OEVELOPMENT CP	15- 34	24	+1/4	+1.0
O	MCI COMMUNICATIONS	7- 13	12 3/4	+1 1/4	+10.8
O	MNGT SCI AMER INC	7- 16	12 1/2	+3/8	+3.0
O	MATHEMATICAL APP GRP	1- 8	1 3/4	-1/8	-6.6
O	MICOM SYSTEMS INC	12- 35	22 1/4	+1/4	+1.1
O	MICROPRO INT'L CP	2- 4	2 1/4	0	0.0
O	NATIONAL OATA CORP	8- 18	17 7/8	+7/8	+5.1
O	ON-LINE SOFTWARE INT	4- 11	10	0	0.0
O	PANSOPHIC SYSTEMS	14- 29	29 1/4	+2 1/4	+8.3
N	PLANNING RESEARCH	11- 19	14 1/2	-3/8	-2.5
O	POLICY MGMT SYSTS CP	17- 35	18	+1 1/4	+7.4
O	PROGRAMMING & SYS	4- 9	7 7/8	+1/8	+1.6
O	REYNOLOS & REYNOLO	31- 57	54 3/4	+2 3/4	+5.2
O	SEI CORP	13- 26	24	-1/4	-1.0
O	SHAREO MEOICAL SYST	26- 37	34 7/8	+4 7/8	+16.2
O	SCIENTIFIC COMPUTERS	5- 8	5 1/4	+1/8	+2.4
O	SOFTWARE AG	12- 22	19 1/8	+3/8	+2.0
N	URS CORP	10- 14	12	0	0.0
N	UCCEL	11- 17	15 3/8	-3/4	-4.6
O	VM SOFTWARE	17- 24	21 3/4	-3/4	-3.3

SEMICONOUCTORS

EXCH		52-WEEK RANGE (1)	CLOSE JAN 29 1986	WEEK NET CHNGE	WEEK PCT CHNGE
N	AOVANCEO MICRO OEV	22- 36	28 1/4	+1/4	+0.8
O	AOV'O SEMICONOUCTOR	7- 23	9	0	0.0
N	ANALOG OEVICES INC	18- 28	26	0	0.0
O	ANALOGIC CORP	11- 16	14 1/4	+1/4	+1.7
N	APPLIEO MAGNETICS CP	9- 17	16 3/4	-1/4	-1.4
O	AVANTEK	18 26	19 1/4	+1	+5.4
O	HAOCO CORP	3- 7	5 3/4	-1/4	-4.1
O	INTEL CORP	21- 33	28 3/4	-3/4	-2.5
O	MICRO MASK INC	6- 12	6 1/2	-1/4	-3.7
N	MOTOROLA INC	29 41	40	+3 1/8	+8.4
N	NAT'L SEMICONOUCTOR	10 15	12 3/4	+1/4	+2.0
N	TERAOYNE	17 33	22 1/4	+1/4	+1.1

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE			
		52-WEEK RANGE (1)	CLOSE JAN 29 1986	WEEK NET CHNGE	WEEK PCT CHNGE
P	AM INTERNATIONAL	3- 6	5 7/8	+1/4	+4.4
A	ANDERSON JACO8SON	2- 5	2 3/8	+1/8	+5.5
O	AST RESEARCH INC	7- 33	27 5/8	+1 1/2	+5.7
O	AUTO-TROL TECHNOLOGY	3- 13	4 3/4	+3/8	+8.5
O	AVANT-GAROE COMPUTNG	3- 21	5	+1/4	+5.2
O	BANCTEC INC	6- 12	7 7/8	-1/8	-1.5
O	BEEHIVE INT'L	1- 2	1/8	0	0.0
N	BOLT,BERANEK & NEW	20- 37	33 7/8	-5/8	-1.8
O	CAMBEX CORP	1- 3	1 1/8	0	0.0
N	CENTRONICS OATA COMP	3- 11	4 5/8	0	0.0
A	CETEC CORP	6- 9	7 3/8	+1/8	+1.7
A	COGNITRONICS	4- 7	4 1/4	+1/4	+6.2
N	COMPUGRAPHIC CORP	24- 36	25 5/8	-7/8	-3.3
O	COMPUTER TRANSCEIVER	0- 1	3/8		+16.7
N	COMPUTERVISION CORP	9- 44	11 1/2	-1/2	-4.1
N	CONRAC CORP	12- 17	16 3/8	+1/8	+0.7
A	OATAPROOUCTS CORP	11- 20	14	-1 1/8	-7.4
A	OATARAM CORP	4- 9	9 1/8	+7/8	+10.6
O	OATA SWITCH CORP	4- 9	6 1/4	0	0.0
O	OATUM INC	5- 9	5 1/4	-1/4	-4.5
O	OECISION OATA COMPUT	10- 20	12 1/8	-3/8	-3.0
O	ENOATA, INC	2- 8	4 1/4	0	0.0
O	EVANS & SUTHERLANO	12- 21	21	+1 3/4	+9.0
O	GANOALF TECHNOLOGIES	5- 13	6	-1/2	-7.6
N	GEN'L OATA COMM INO	8- 21	11 1/4	0	0.0
N	HAZELTINE CORP	20- 30	23 5/8	0	0.0
O	ICOT CORP	3- 10	9 3/4	+1 3/8	+16.4
O	INFORMATION INTL INC	10- 17	13 1/2	+1/2	+3.8
O	INTECOM INC	4- 11	4 3/4	-1/4	-5.0
A	LUNOY ELECTRONICS	10- 15	13 5/8	-1/4	-1.8
O	MEGAOATA CORP	3- 8	4	-1/4	5.8
A	MSI OATA CORP	7- 13	10 5/8	-1/4	-2.2
N	NASHUA CORP	24- 32	31 5/8	+1	+3.2
O	NETWORK SYSTEMS CORP	14 27	16	+1/8	+0.7
N	NO AMERICAN PHILIPS	32- 45	39	+1	+2.6
N	NORTHERN TELECOM LTO	26- 41	25 7/8	-1	3.7
O	OMEX	1- 3	1/2	0	0.0
N	PARAOYNE CORP	7- 18	6 5/8	0	0.0
A	PENRIL CORP	7- 14	8 1/8	-1/4	2.9
N	PLESSEY CO (AOR)	19- 28	21 3/4	-3/4	3.3
O	PRINTRONIX INC	9 18	12 5/8	-1/8	-0.9
O	QMS INC	6- 16	11 1/8	+3/4	+7.2
O	RAMTEK CORP	2- 7	3 3/8	+1/8	+3.8
N	RECOGNITION EQUIP	9- 17	15 1/4	+3/8	+2.5
N	SANOERS ASSOCIATES	30- 44	33 5/8	-1 1/8	-3.2
O	SCAN-TRON CORP	9- 17	17	+1/2	+3.0
N	SCIENTIFIC ATLANTA	10- 15	11 3/4	-1/4	2.0
O	SEAGATE TECHNOLOGY	5- 9	8 3/4	+1 1/4	+2.9
N	STORAGE TECHNOLOGY	1- 4	3 1/8	+1/4	+8.6
O	SYKES OATATRONICS	0- 2	1/8	0	0.0
A	T BAR INC	5- 9	5 7/8	1/8	-2.0
A	TA8 PROOUCTS CO	14- 21	18	+3/8	+2.1
O	TANOON CORP	3 9	4 1/8	1/4	-5.7
A	TEC INC	6- 13	6 3/8	1/8	1.9
N	TEKTRONIX INC	47- 68	55 3/4	-1/2	-0.8
N	TELEX	34 64	63 3/4	+2 3/4	+4.5
O	TESOATA SYSTEMS CP	0- 3	1 1/8	1/8	10.0
N	TIMEPLEX INC	15- 23	16	-7/8	5.1
N	TITAN CORP	4 11	10 7/8	+1 1/4	+12.9
O	VISUAL TECHNOLOGY	1 3	5/8	1/16	8.2

LEASING COMPANIES

EXCH		52-WEEK RANGE (1)	CLOSE JAN 29 1986	WEEK NET CHNGE	WEEK PCT CHNGE
N	COMOISCO INC	10- 29	23 5/8	2 1/4	8.6
N	CONTINENTAL INFO SYS	5- 16	15 1/4	1/4	1.6
O	FINALCO GROUP INC	4 5	4 1/4	+1/8	+3.0
O	PHOENIX AMERICAN INC	2 4	3 3/4	-1/8	3.2
O	SELECTERM INC	7 12	6 1/2	-1/2	7.1
N	U.S. LEASING	32- 43	37 5/8	-3/8	0.9

Source: Trade Quotes, Inc

COMPUTER INDUSTRY

INSIDE

Ability software may soon have a new owner and a new lease on life/**96**

DCA stakes a larger claim in the micro-mainframe market by acquiring Forte Communications/**97**

Software vendors band together to fight piracy/**99**

A transition phase for Cullinet Software/**120**

INSTANT ANALYSIS

"IBM's sheer size may be less of a competitive problem for Digital Equipment Corp. today than it was five years ago. . . . DEC has begun to make significant market share gains against IBM and others in the midrange computer market."

— Stephen K. Smith
Paine Webber, Inc.

IBM may cut stake in Intel

Debt offering would reduce IBM's 20% partnership role

By Clinton Wilder

ARMONK, N.Y. — In a move that would roughly reduce its equity stake in Intel Corp. to the original 12% purchased more than three years ago, IBM last week announced that it may sell about 40% of its Intel shares through a $300 million debt offering later this year.

The surprise announcement represented a significant retrenchment by IBM from its investment in Santa Clara, Calif.-based Intel, a deal considered a major industry coup for IBM in 1983. The debt offering essentially scales back IBM's partnership role of 20% ownership in favor of a more traditional customer-supplier role with the Silicon Valley semiconductor pioneer. IBM remains Intel's largest customer.

"This does not mean at all that IBM is getting out of Intel," said Paul Johnson of L. F. Rothschild, Unterberg & Towbin. "The original investment was an insurance policy to make sure Intel maintained aggressive research and development on the 80286 and 80386 chips. Now, those products are out or in production, Intel has $600 million in cash and is obviously a long-term survivor. The insurance policy doesn't need to be that strong."

Other analysts noted that the retrenchment was consistent with IBM's tradition of not relying too heavily on any one vendor for computer components. The computer industry is riddled with factories and companies suffering the consequences of nonrenewed IBM supply contracts, the most recent being disk drive maker Computer Memories, Inc. of Irvine, Calif.

"The original 1983 IBM-Intel agreement came when microprocessors were in short supply; now there's an overcapacity," said Sheridan Tatsuno, a semiconductor industry analyst with Dataquest, Inc. in San Jose, Calif. "IBM does not like to single

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Spectrum too late for '86 gains

By Maura McEnaney

PALO ALTO, Calif. — Hewlett-Packard Co. will introduce its long-awaited Spectrum workstation at the end of the month, but product shipments are not expected to enhance HP's revenue in 1986, HP President John Young said last week. Young's comments to a meeting of security analysts essentially confirmed speculation that the reduced instruction set computing (RISC)-based machine may not ship until the fourth quarter of this year. [CW, Jan. 27].

HP Executive Vice-President John Doyle said the RISC machine will have higher performance than HP's 3000/68 and will run a version of the MPE operating system, allowing current users of the 3000 series machines to migrate to the compatible software. "Spectrum will not be a replacement for the current 3000 series," Doyle said.

More than 1,000 employees in HP's information technology group have been working on the Spectrum program. Some 300 prototype units are in the in-house performance testing stage, Doyle said.

After a year of losses, manufacturing cutbacks and reduced workweeks, Young told analysts that HP experienced a modest improvement for the first two months of fiscal 1986. Orders increased 6% during that period over year-ago totals. Domestic orders increased 3% over the first two months of fiscal 1985, and international orders increased 9% from a year ago.

1986 will see HP venturing into the communications business, according to general manager Bill Kay. Within six months, the company will introduce an IBM 3270 emulation gateway for connection to supercomputers as well as a 3270 emulation gateway to IBM mainframes for some selected customers.

INDUSTRY INSIGHT
Clinton Wilder
CW Senior Editor

Shaking off the marketing bug

When a company or an executive becomes obsessed with marketing hype, the affliction can be harder to shake than the Asian flu. Nowhere is this more apparent than at computer industry conferences, where ostensibly unbiased and informative session topics find themselves magically transformed into nothing more than your basic corporate sales pitch.

Although the recent Frost & Sullivan, Inc. third-party maintenance conference in San Diego was certainly not the first trade convention to suffer from such a fate, it provided a striking example of the marketing wolves in "industry expert" sheep's clothing.

This phenomenon had many attendees muttering about why they plunked down $800 or traveled two or three thousand miles, but the blame can't really be placed on conference organizers. Presumably, when the conference leader assigns a topic such as acquisitions and divestitures or the service management concept, he, like everyone else, expects a relatively balanced, instructive presentation on the subject.

But as college literature professors are fond of saying, "Note the difference between appearance and reality." The antennae of conference attendees should go up when the speaker's color slides come out and he intones, "First, let me tell you a little about our company." Years of experience, state-of-the-art facilities and, above all, an unyielding commitment to the customer are invoked. And on and on and on.

At the third-party maintenance con-

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Slump continues to mar industry; Lotus, AT&T report profit declines

By Clinton Wilder

The lingering effects of the 1985 computer sales slump continued to have an impact on a wide range of companies reporting fourth-quarter results last week. Lotus Development Corp. suffered its second consecutive quarter of a year-to-year profit decline, and AT&T's disappointing computer sales contributed to a small drop in quarterly earnings.

Slow sales of Jazz software for the Apple Computer, Inc. Macintosh took their toll on Lotus in the fourth quarter as the Cambridge, Mass., firm took a hefty $6 million charge for Jazz advertising costs. That expense plus a one-time $1 million charge for research and development offset gains from what the company said were strong sales of 1-2-3 Release 2 and other products. The overall result was a 3.3% decline in profits to $11.4 million, or 70 cents per share. But revenue increased by 42% to $71.8 million.

Combined with Lotus's 30% earnings decline in the third quarter, the fourth-quarter setback held profit growth for the year to a modest 5.6%. Lotus earned $38.1 million, or $2.31 per share in the 12-month period, compared with $36 million, or $2.24 per share in 1984. Sales grew 44% to $225.5 million.

Lotus spokesman Bruce Rogers said the company's financial performance is more closely tied to the health of the overall micro software industry than it has been in the past. He said that Lotus is "reasonably optimistic" about the outlook for 1986 and that flagship products like 1-2-3

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DG looks to June recovery

High-end shipments expected to spur gains

By Clinton Wilder

BOSTON — Data General Corp. will not see much recovery from its current financial doldrums until the quarter ending June 1986, DG President Edson D. de Castro said at the company's annual meeting last week.

De Castro said business is not expected to pick up until volume shipments of the high-end MV/20000 superminicomputer and other recently announced products begin. He said that until those products reach this volume-shipping stage at the end of the current quarter, DG will continue to experience the impact of customer hesitation on its older product line.

"We do not expect any meaningful increase in order vitality until those shipments," de Castro told the annual meeting audience, which consisted mainly of security analysts. He noted that the disappointing results from the company's first quarter ended Dec. 28 stemmed from "erratic and unpredictable" order rates as customers paused to evaluate the new offerings.

De Castro painted a picture of a company clearly in a transition phase to both a new high-end product line and a new customer mix. While end-user sales accounted for a mere 5% of DG's sales five years ago, de Castro said the company now earns 60% of its revenue from direct user sales.

"The idea that we are still largely an OEM company is a myth," he said. "An increased percentage of end-user sales gives us more balance and diversity."

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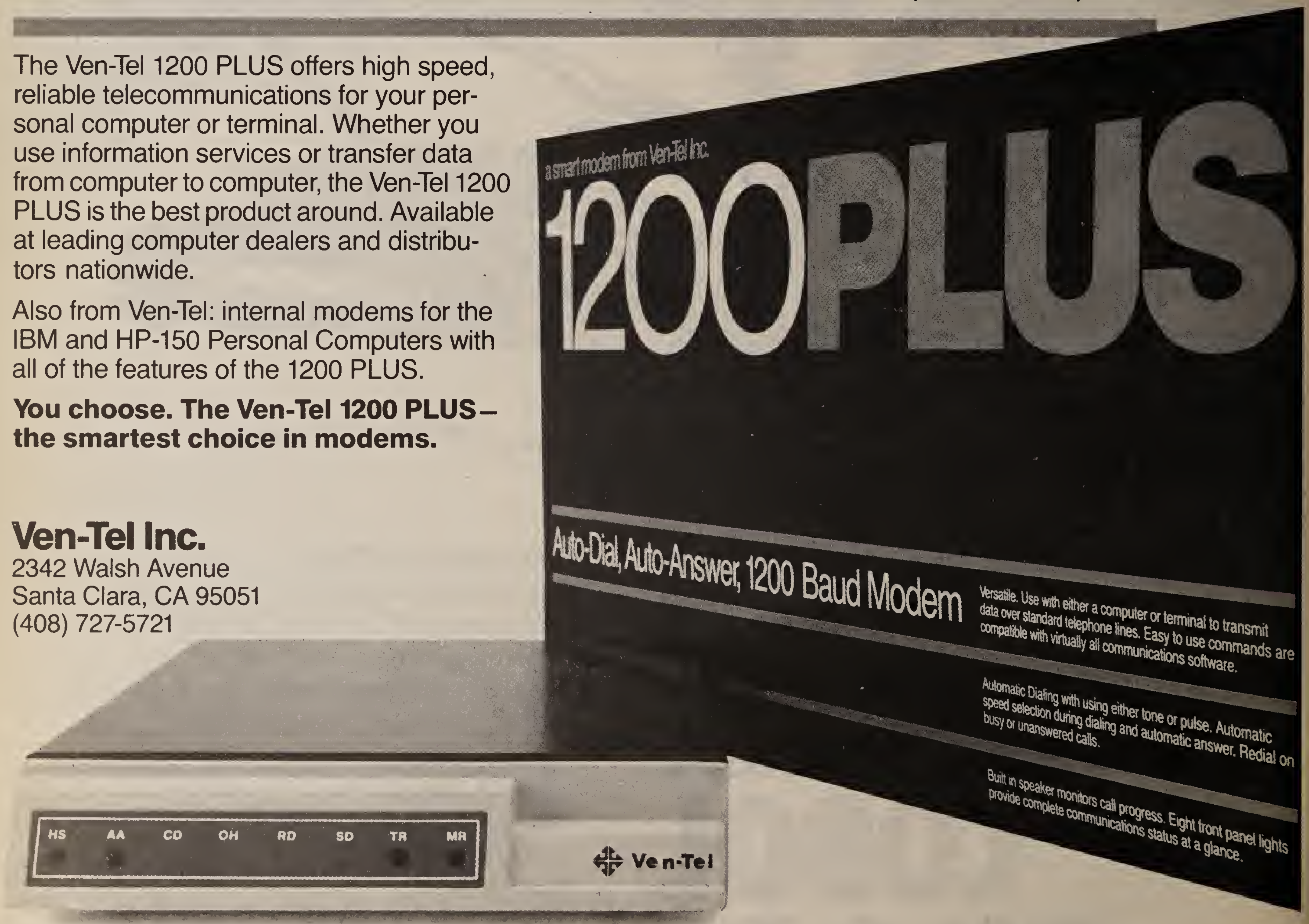
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